Journal of FORESTRY

November, 1961

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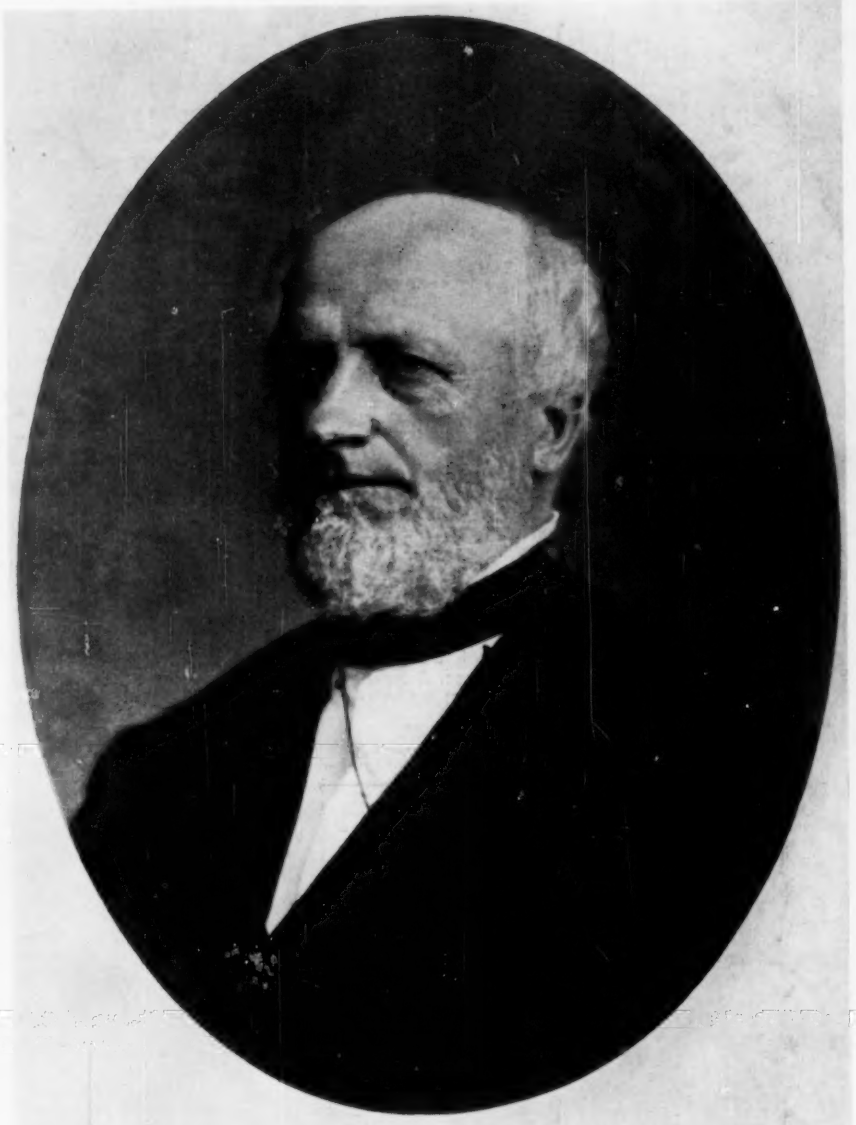
"Chiefs of the Forest Service"



Franklin B. Hough.

SOCIETY OF AMERICAN FORESTERS 1900

Volume 59

Number 11

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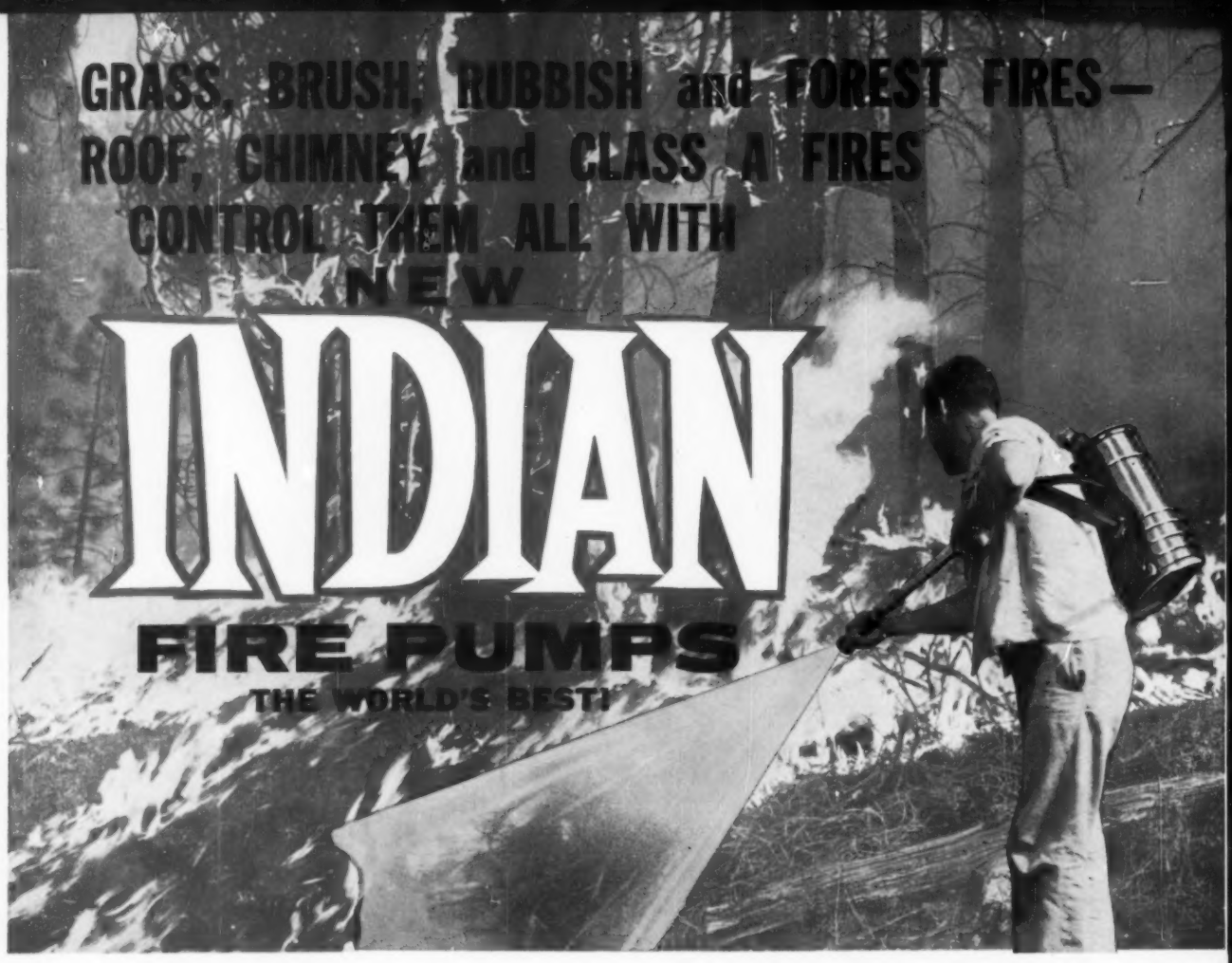

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Photo from the collections of the Library of Congress

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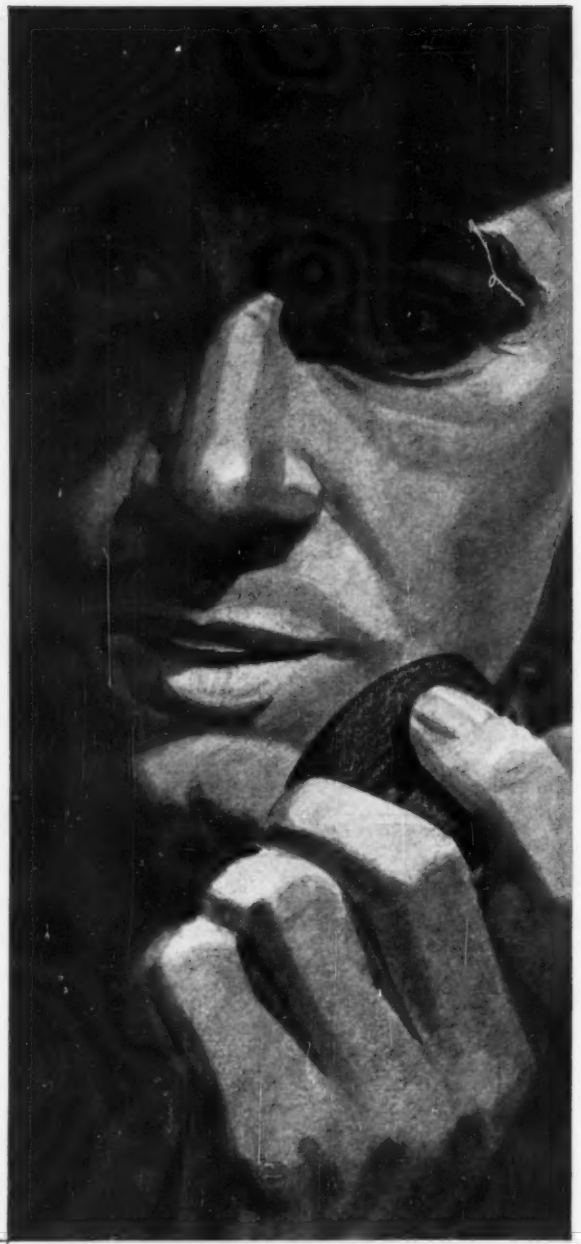

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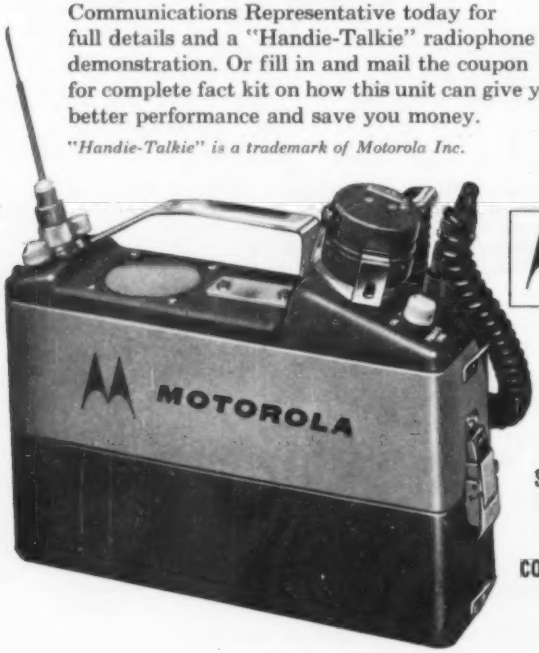

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Journal of Forestry

Official Organ of the Society of American Foresters

Chiefs of the Forest Service

Henry Clepper

JUST eighty-five years ago American forestry had its tentative and modest official beginning when in 1876 the first citizen was appointed by the federal government to investigate and make a report on forest conditions. Designated as an agent, Franklin B. Hough was the earliest of an unbroken line of men who served in the several positions, under several titles, as heads of forestry work in the Department of Agriculture.

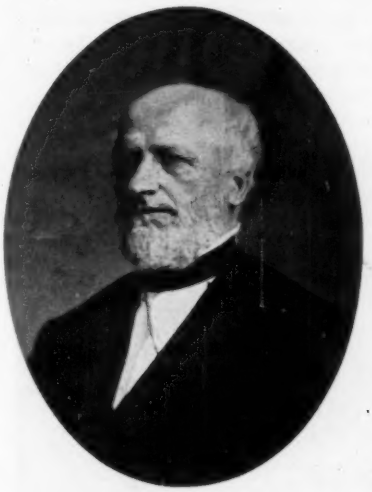
For simplicity's sake, they are hereafter called chiefs of the Forest Service. There have been eleven in all.

The first two—Hough and Eglesston—were not foresters, although they had both been interested and active in forest conservation. But succeeding chiefs, beginning with B. E. Fernow, all had education and field training in forestry.

Some of the chiefs made greater impacts on public, as well as on professional, policy than others. For most, the conditions of the period and of the political climate in which they functioned were favorable. For others, they were not.

In the following sketches I have tried to give a brief account of the accomplishments during each chief's term of office. Some chiefs thus get credit for programs which were matured under their administrations, but which were initiated in previous administrations.

At the same time I have tried to show what kind of men they were and are, in their personal as well as their official character. These sketches are snapshots, so to speak, not full-length portraits. My excuse for writing about them—wholly apart from historical reasons—is that I personally knew all except the first three. I had the honor of serving under Mr. Pinchot and Major Stuart in Pennsylvania, under Mr. Silcox in the Forest Service, and with Dr. Clapp, Dean Graves, Colonel Greeley, Dr. McArdle, and Mr. Watts in the work of the Society of American Foresters.



FRANKLIN B. HOUGH

Of the new generation of American foresters that has come on since World War II, few have had opportunities to know more than the two most recent chiefs. Consequently, this article is intended to provide an introduction to the men who have served in this, the top forestry office in America, and the most important in the world.

These then are the chiefs of the Forest Service. They were—and are—eminent men.

Franklin B. Hough
First Federal Agent

Franklin B. Hough of Lowville, N. Y., was the first official designated by the federal government whose special assignment was forestry. The year was 1876. His appointment came about in this way.

An early effort to arouse public interest in the conservation of woodlands resulted from an address he gave before the American Association for the Advancement of Science in 1873 in Portland, Maine. Its title was "On the Duty of Governments in the Preservation of Forests."

When the AAAS set up a committee to promote federal and state forestry programs, Dr. Hough was named chairman. Congress was asked to create the position of federal commissioner of forestry whose duties would be to report on the status of woodlands, rate of consumption and measures needed to assure future timber supplies, the influence of forests on climate, and methods of forestry practice in Europe. The Department of Agriculture received in 1876 an appropriation of $2000 for a special agent to investigate and report on forestry; Dr. Hough was appointed on August 30.

Although he lacked training in forestry—indeed in that day there were no Americans with professional education in forestry—he was an observing layman with an intelligent curiosity about forest conditions. He had been a physician in the Civil War, with inter-

THE AUTHOR is executive secretary of the Society of American Foresters and managing editor of the JOURNAL OF FORESTRY.

ests also in nature, history, and statistics, and was an indefatigable writer of letters, speeches, and articles.

Presumably, he became interested in forestry while serving as superintendent of the New York State census and as a member of a commission on state parks. His knowledge of forestry, which was considerable for that pioneering era, was acquired later during the course of his work in the federal government.

His first official *Report upon Forestry*, submitted to Congress in 1877, was a voluminous document of 650 pages. Congress ordered the printing of 25,000 copies. Noteworthy are the large number printed and the fact that Congress was willing to expend the not inconsiderable amount necessary even in a period of relatively low costs. In all, he issued three reports; the second in 1880 and the third in 1882. They comprise a miscellany of information, mainly on the forests of the United States, but also on Canada and Europe. Among other plans to advance the knowledge of forestry, he advocated stations for research, the study of forest fire, and observations of weather to learn about the influence of wooded areas on climate.

Having gone to Europe in 1881 to study forestry practices there and to learn how they might be applied in America, he published the results of this trip in his third and last report in 1882.

Meanwhile, in 1881 his agency was made a separate Division of Forestry in the Department of Agriculture. It was to remain a Division for the next twenty years.

Dr. Hough had practically no staff or facilities for field work in research, and precious little money for travel. Yet he did get around the country, calling on governors and state officials to obtain data on forest conditions and to induce them to pass laws for forest preservation. Through these contacts and by correspondence he gathered a wealth of information. Thus his contributions were largely of two kinds, both useful during those formative years: fact-finding and reporting on the one hand, and urging action by the federal and state governments on the other.

A prolific writer as well as a prodigious worker, his production is amazing. For example, in 1882, while he was still in the Division of Forestry, his book *The Elements of Forestry* was published. It was the first American textbook on the subject.

Also in 1882 he started the *American Journal of Forestry* which was published one year only. It failed for lack of financial support. Prophetically, he declared, "The time will surely come when such an enterprise will be demanded, and will be sustained, although perhaps not now."

Not all his views were as accurate in foretelling events. In a paper on "Forestry Education" read before the American Forestry Congress in St. Paul in 1883, he advocated the giving of lectures on forestry in secondary schools, but saw no need for technical education in forestry. He doubted that persons especially trained in forestry, as in the forestry schools of Europe, would find employment in America.

NATHANIEL H. EGLESTON

Dr. Hough was replaced in 1883 as head of the Division of Forestry, but continued to work as a divisional agent.

Samuel T. Dana has thus summarized his career: "Certainly he was one of the outstanding leaders of the day in bringing about public appreciation of the importance of the country's forest resources and of the need for their conservative management."

Nathaniel H. Egleston
The Transition Agent

Nathaniel H. Egleston of Jamaica Plain, Mass., was appointed head of the Division of Forestry in 1883. A Congregational minister and former teacher with an interest in forestry and country life, he helped organize The American Forestry Association and was one of its vice presidents, but he had little, if any, previous experience in forestry.

Gifford Pinchot, never one to hesitate calling a spade a spade, once wrote of him as "one of those failures in life whom the spoils system is constantly catapulting into responsibile positions." Samuel T. Dana's comment on Hough's replacement by Egleston was: "Whatever the reasons for the change, they were not based on the relative competence of the two men."

In 1883 the Division's personnel consisted of the chief and three field agents. Its annual appropriation was $10,000.

Dr. Egleston's first annual report emphasized the need for the government protecting its own timber holdings. "It has no property as valuable as its forests," he wrote. "Its mines, its forts, its ships, the coined money in its vaults, taken together, are hardly comparable to them." In this connection, it should be remembered that the government's public lands were administered by the Department of the Interior; the Division of Forestry was in Agriculture.

Among other proposals, he recommended that the government engage in forestry education and establish forest research stations. In his second report in 1884 there were special accounts by Dr. Hough and others on reforestation, silviculture, forest description, and wood utilization.

With characteristic candor, Mr. Pinchot wrote, "After three years of innocuous desuetude, Dr. Egleston in turn was replaced on March 15, 1886, by Dr. Fernow. . . ." However, Dr. Egleston remained in

government work until 1895, compiling pamphlets on forestry and tree planting.

Without wishing to detract from whatever accomplishments the reverend doctor may have had to his credit, one is hard put to it to find any outstanding achievements. In truth, he is little more than a name in forestry literature. And not even his name appears in the index of Ise's well-documented *United States Forest Policy*.

In summary, he appears to have been a conscientious worker, sincere in his efforts to promote the cause of forestry. And, most importantly, interest in forest conservation continued to advance during the three years he was in office.

Bernhard E. Fernow
First Professional Forester

Bernhard E. Fernow, a native of Germany who became a citizen of the United States, was appointed Chief of the Division of Forestry in 1886, Congress having given it legal status that year.

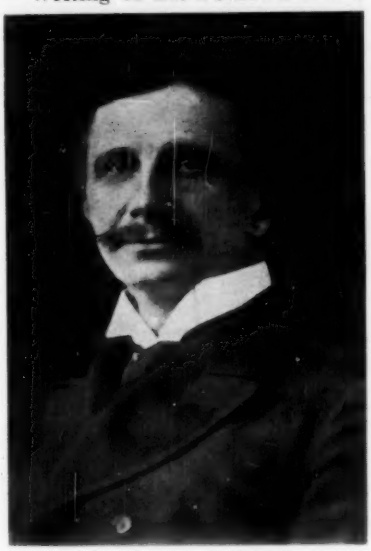
On assuming office, Dr. Fernow had one important qualification which his two predecessors lacked —education in forestry, obtained at the forest academy in Muenden in western Prussia. Thus, literally, he was the only man in America at that time who truly deserved the title of professional forester.

During his twelve productive years as Chief of the Division Dr. Fernow stamped an imprint on forestry that has persisted to this day. Possibly his most lasting influence was in the passage in 1891 of the Forest Reserve Act that authorized the creation of forest reserves from the public domain. This was the epochal event that initiated the present national forest system.

He was a busy lecturer and publicist. Working with prominent men in science, with the members of The American Forestry Association, and with other officials of government, he carried on a campaign of public education to inform people about the need for forest conservation. An example of the cooperation he obtained was the forestry exhibit at the World's Fair of 1893.

William B. Greeley wrote of Fernow, "He gave America her start in forest literature, with a series of monographs and bulletins whose number, breadth of field, and technical quality were phenomenal, particularly in view of the limited resources for research at his command. Not only did he lay the beginnings of the science of silviculture in the United States; he initiated the technical study of wood utilization, the research into timber physics and allied subjects which has subsequently grown to such large proportions and have brought such admirable results in conservation through better use of the timber which we already have."

Writing of Dr. Fernow's twelve



BERNHARD E. FERNOW

years as Chief of the Division of Forestry, following his death, Ralph S. Hosmer said, ". . . his was the guiding hand in almost every project that had to do with the advancement of forestry. . . . Dr. Fernow had very much to do with creating an intelligent public interest in forestry. It was in no small part the public sentiment that resulted from this interest that made possible in later years the rapid development of the Forest Service.

"Dr. Fernow was, however, not concerned merely with propaganda during those years in Washington. In his support of dendrological research, of experiments in tree planting in the Plains States, and the investigations in timber physics, that the Division of Forestry carried on, he was mindful of the scientific basis without which forestry could not exist. Hampered throughout his administration by meager appropriations and assisted only by a very small staff, the accomplishments of that time are worthy of most grateful recognition. The timber physics work was but a beginning, but it foreshadowed the comprehensive investigations now being carried on by the Forest Products Laboratory of the Forest Service; so with other work which he started. It pointed the way to what has since been achieved."

His influence was present in most of the state laws enacted during this period for the establishment of state departments of forestry and the protection of forests from fire. He was tireless in advocating enlightened forestry policies by all governments—state as well as federal.

Called to Cornell University to organize the New York State College of Forestry, Dr. Fernow left the Forest Service in 1898.

Summing up the period of Hough, Egleston, and Fernow, Dana calls it "one of education and preparation. Through the efforts of a relatively few devoted men, public interest was aroused and the way was paved for the adoption of a constructive federal forest policy."

Gifford Pinchot
Crusading Conservationist

Gifford Pinchot was the first native American to acquire formal instruction in forestry. His forestry education was obtained abroad, largely in France, as there was no institution in the United States offering a curriculum in this subject.

"Friday, July 1, 1898, was a red-letter day for me," he once wrote. "On that day I became chief of the little old Forestry Division. I was highly enthusiastic and deeply pleased. Yet the prospect was somewhat less than brilliant."

Still pitifully small as to funds and personnel (it had ten persons in it), the Division neither owned nor managed any forest land. Its activities were largely concerned

with getting out reports and bulletins. In short, it was mainly an office of information.

Mr. Pinchot soon changed all that. Given the title of Forester instead of Chief, he set out to help private timberland owners apply forestry to their lands. At the end of his first year in office, 123 owners having 1½ million acres in 35 states had requested assistance. In addition to this major objective—to get forestry actually practiced in the woods—he had another. This was to get the forest reserves transferred from Interior to Agriculture.

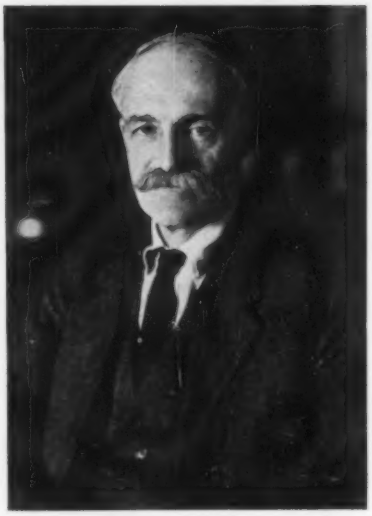
The Division of Forestry became the Bureau of Forestry by law in 1901. Then in 1905 the administration of the forest reserves was transferred from Interior to Agriculture by act of Congress. And still another act that year changed the name of the Bureau of Forestry to the Forest Service.

How scant was the attention paid by Uncle Sam to the stewardship of his lands is indicated by the fact that not until 1906 was a charge made for grazing livestock on the forest reserves.

Then followed in 1907 another act which was to set the pattern for forest administration that has persisted up to this time. The forest reserves were designated as national forests. Appropriations were increased. And the salary of the Forester was raised from $3,500 to $5,000. In that year also Congress appropriated funds for a survey of woodlands in the Appalachian and White Mountains for the first national forest acquisition in the East.

Developments followed fast. In 1908 the first historic Conference of Governors met in Washington, D. C. at the invitation of President Theodore Roosevelt. One result was the appointment of a National Conservation Commission, with Mr. Pinchot as chairman. Two other historic events in that year were the establishment of the first federal forest experiment station at Fort Valley, Arizona, and the creation of the Forest Service's present decentralized regional organization.

In 1910 occurred the famous



GIFFORD PINCHOT

Ballinger-Pinchot controversy. This dispute, involving allegations of failure to safeguard certain resources in Alaska including coal, directed against the Secretary of the Interior by Mr. Pinchot, resulted in the latter's dismissal as Forester by President Taft.

The growth of the national forests was perhaps the most spectacular and significant tangible accomplishment of the Forest Service during Mr. Pinchot's ten-year tenure. From 51 million acres in 1901, more than 100 million in 1905, they had reached 175 million by 1910.

But an intangible, though most important, accomplishment was the extent to which "conservation" became a widely known concept and national goal. Mr. Pinchot's crusade for conservation was ably abetted by President Roosevelt.

HENRY S. GRAVES

During this period many state forestry departments and commissions were created. Several schools of forestry were established; most notably the Yale school, supported by a grant of funds from the Pinchot family.

Finally, the record would be incomplete if mention were not made of the Society of American Foresters, organized November 30, 1900 in Mr. Pinchot's office, with seven charter members. He was the first president and served for eight years.

Henry S. Graves
Consolidator and Builder

Henry S. Graves of New Haven, Conn., the second native American to become a professional forester, dean of the Yale University School of Forestry, was appointed Forester in 1910.

One of the first events of the new administration was the establishment of the Forest Products Laboratory at Madison, Wis. Then, in the following year, Congress enacted the far-reaching Weeks Law which provided for federal and state cooperation in protection from fire, and for the acquisition of national forests on the headwaters of navigable streams.

The year 1910 was one of disastrous forest fires, which burned nearly five million acres and destroyed three billion board feet of timber. The next year the Forest Service began in earnest the scientific study of fire prevention and control. There also followed a notable increase in reforestation which heretofore had been largely on an experimental basis.

Forestry had progressed to the point where more, much more, research was needed. In 1915 the Branch of Research was established in the Forest Service. This was indeed a giant step forward. It not only correlated all the experimental work, but it gave research a status equal to the Service's administrative branches.

Lumber as a commodity basic to American economic welfare was given especially intensive study. Its

importance was further emphasized by the United States entry into World War I. Industry and government were called on for wood for war, and the Forest Service went all out in research and production. The Forester was assigned by the War Department to help set up a regiment to engage in logging and milling in France. He held the temporary title of lieutenant colonel.

Following the war, the Forest Service under Mr. Graves began a campaign for the public regulation of timber cutting on private land. The movement stemmed largely from the cut-out-and-get-out operations of an industry that was still migratory. Many owners let their devastated, logged-over lands revert to counties for unpaid taxes. Few owners managed their lands under the principle of sustained yield, a principle that was little understood because it had scarcely been defined. According to Mr. Graves, the public for its own protection should prohibit destructive cutting by law. This debate was to continue for the next two decades. He remained an advocate of public regulation until he died.

After having served as Forester for a decade, he resigned in 1920.

Writing of Mr. Graves following his death in 1951, Ralph S. Hosmer offered this perceptive and deserved tribute: "Because of his life, his character, and his accomplishments it may be truly said that Henry Solon Graves represented the best and finest in American forestry. Let us remember and be grateful that our profession in the United States has had the guidance of such a man."

William B. Greeley
Pragmatic Cooperator

William B. Greeley, a Forest Service career officer, became Chief Forester in May 1920.

It was not a sinecure. The recent war had caused dislocations in the organization, there was a high turnover in the personnel, salary scales were low, and problems began pressing for solution.

His annual report for that year set forth a program calling for federal leadership and aid in halting forest devastation, but with a large share of responsibility and funds to be borne by the states and private land owners. This policy was contrary to that of Mr. Pinchot who insisted that federal control of private timberlands alone would halt forest devastation.

Put simply, the Forest Service's official policy under Colonel Greeley was that the control of forest devastation was a problem that was national in scope, with federal leadership essential, but that the actual regulation of private forest management was the responsibility of the states.

An attempt was made—there

WILLIAM B. GREELEY

would be others—by Secretary of the Interior Albert Fall of Teapot Dome notoriety to gain control of grazing on the national forests and later of the national forests themselves. Attempts were made also to legislate vested rights in the range to stockmen. These were successfully fought off.

It was during Colonel Greeley's administration that the Clarke-McNary law of 1924 was enacted. This act established a fundamental forest policy for the nation by providing for federal-state cooperation in fire control, reforestation, and farm forestry extension. For this legislation, the JOURNAL OF FORESTRY reported, he "must be given overwhelmingly the main credit, and for it and the notable advance that has been made since its enactment his administration of the Forest Service will stand out as one of the great historic land marks of progress in the national forestry movement."

In the biography *William B. Greeley; a Practical Forester,* published in 1961 by the Forest History Society, the author, George T. Morgan, Jr., sums up Colonel Greeley's philosophy as Chief Forester:

"First and foremost, he was a forester—not a crusader. The principal need for the present was to halt devastation and reforest. To achieve this objective he would employ every conceivable device at his command. The lumbermen had constructive ideas — incorporate them. Make full use of embryonic forestry programs in many states, and capitalize on their generally accepted police power to regulate for the general welfare. Supplement these existing elements with federal cooperation and add to the program as conditions warranted, but first eliminate the fire hazard and begin reforesting. Above all, do not divert energies tilting at windmills."

The influence of the Forest Service and of its Chief was felt in many aspects of forestry during the 1920's. Public interest manifested itself in increased appropriations by the states, especially for protection. There was increased enrollment in the forestry schools. There was increased acquisition of publicly owned forests.

When he left the Forest Service in 1928, after eight years as Chief, national forest administration had been strengthened and tightened. But more important than that, the concept of federal-state-private cooperation had been written into law and was actually producing results in halting forest devastation.

On Colonel Greeley's retirement as Chief Forester, the late Herbert A. Smith, wrote an appreciation from which the following quotation tells as much about him as anything can:

"The eight years that the Forest Service has been under the leadership of its present chief have been

years of continuous progress. Externally, the influence of the Service has been increased, its field of usefulness extended, and its prestige heightened. Internally, it has gained greatly in efficiency of organization and in cleared definition of its task, while its morale and fine tradition of service to the public welfare have been fostered and maintained."

Perhaps the ultimate tribute to Colonel Greeley was written by one of his colleagues: "Never shall we have a leader with less of the bureaucrat in his makeup."

Robert Y. Stuart
Indefatigable Worker

Robert Y. Stuart, also a Forest Service career officer, who had taken leave to serve as Secretary of the Pennsylvania Department of Forests and Waters under Governor Pinchot, became Forester on May 1, 1928. He moved into this office in a period when a depression in lumber markets presaged the advent of the great economic depression of the 1930's.

A Timber Conservation Board was appointed by President Hoover with Major Stuart as chairman of the advisory committee. One result of its studies was a Forest Service report, "The Forest Situation in the United States." An obvious need, even if a temporary one, was to curb lumber production, and the President requested the Secretary of Agriculture to restrict national forest timber sales.

Perhaps the most significant forestry legislation adopted during Major Stuart's administration was the McSweeney-McNary Act of 1928. It authorized a program of research in forestry and range management and provided for a timber survey. From this act grew America's great system of forest and range experiment stations; it charted the main course that research was to follow ever since.

This was followed in 1930 by the Knutson-Vandenberg Act which authorized money for reforestation on national forests. But even more important than that, it provided that the Forest Service could add to the price of stumpage on timber sales the cost of reforestation or silvicultural improvement of the cutover areas. "KV" funds over the years resulted in much needed timber stand improvement.

ROBERT Y. STUART

An interesting footnote to the notable events of this period was the change in 1930 in the names of the old Forest Service "district" and "district forester" to "region" and "regional forester."

In March 1933 there was published a document that was to have a profound influence on informed public opinion. This was the hefty *A National Plan for American Forestry,* known as the Copeland report, prepared by the Forest Service. According to Major Stuart it represented "the most comprehensive and exhaustive survey yet made of the forestry situation in the United States." Among its many recommendations two were salient: an increase in public ownership of forests and more intensive management of public woodlands. This report guided federal forestry policies, legislation, appropriations, and even social and welfare attitudes during the following decade.

In 1933 the United States was in the trough of the depression. An act of Congress on March 31 made funds available to relieve unemployment and to advance the conservation of natural resources. Appropriations were authorized also for forestry research and for the acquisition of lands. Under an act of Congress an executive order by President Roosevelt established the popular Civilian Conservation Corps on April 4.

Moreover, this fateful year brought a tremendous expansion in Forest Service responsibilities and work loads, most of them of an emergency nature as a result of the nation's attempt to surmount the depression. It was a time of tensions. The Forest Service rose to the demands put upon it, but Major Stuart was under pressures great and unrelenting, and died on October 23.

To back up a moment. Upon taking office as Forester, Major Stuart was immediately faced with difficulties and perplexities. There were pressures for retrenchment in spending, and for curtailment in governmental activity generally. In other ways, conditions were not favorable for pushing forestry programs however much they were needed.

Then with the coming of the New Deal there were equally insistent pressures for greater spending and for greater participation by government in all aspects of the American social and economic life. In short, during most of the five years that he was Chief he was to spend his energies battling obstacles and conflicting forces.

F. A. Silcox
New Deal Innovator

Ferdinand A. Silcox, appointed Chief on November 15, 1933, was a former Forest Service career forester who had left forestry and the Service after World War I, and who had entered the field of industrial and labor relationships.

Intensely sympathetic and loyal to the New Deal, he revived the dormant subject of public regulation of private forest management. His proposal was for a three-point program: (1) increased public ownership and management, (2) public cooperation with private owners, and (3) public regulation. For the third point he advocated state regulation with federal participation, with a proviso for direct federal regulation if the states failed to pass and enforce satisfactory laws.

Several pieces of important legislation were enacted during the Sil-

F. A. SILCOX

cox administration. The Fulmer Act (1935) provided for federal aid in the purchase of lands for state forests. In 1937 the Norris-Doxey Cooperative Farm Forestry Act provided for increased technical aid to owners of farm woodland. Farm-forestry projects were started in many counties and a large number of foresters were employed by the states as farm forestry specialists.

The spectacular and imaginative Prairie States Forestry Project was started in 1935. Its purpose was to reduce drought effects, protect crops and livestock, lessen dust storms, and provide employment in the Dust Bowl. Undertaking this tremendous tree planting job under executive order of the President, the Forest Service in seven years was to supervise the planting of some 217 million trees from North Dakota to Texas on some 30,000 farms and ranches.

In response to Congressional action, the Forest Service also participated in two notable studies. One was a special report on the western range. It provided information on range vegetation and use, and on watershed conditions, with suggestions for improvement. The other was a survey of watersheds for flood control. Emphasized was the need for scientific management of forest and range to stabilize streamflow and to reduce damage by floods and erosion.

In a special message to Congress, President Roosevelt in March 1938 requested a study of the forest-land problem of the United States. This study was undertaken by a special Joint Committee of Congress. Much of the burden of providing background information for the committee devolved on the Forest Service.

As if the Forest Service did not have enough problems and special jobs during these hectic New Deal years—what with the Civilian Conservation Corps, emergency conservation work projects, special studies, the Great Plains shelterbelt planting—fate, in the form of the New England hurricane of 1938, created yet another. Millions of trees were blown down and the commercial timber had to be salvaged, quickly. The Northeastern Timber Salvage Administration was created. Supervised by the Forest Service with cooperation by the states, some 700 million board feet were salvaged, fire hazards were cleaned up, and local employment was provided.

But it was to the cause of public regulation that Silcox devoted much of his official time and energy. Colonel Greeley, a long-time friend, writing about this period years later, said Silcox was disposed "to trade government aids in forestry for New Deal social and industrial aims." He added, "I was never sure how seriously Gus Silcox wanted the government to step into the role of forest policeman, patrolling a beat of four and a half million woodland owners. . . . Silcox never offered specific legislation on forest regulation. His proposals were general and vague."

Whether Mr. Silcox would have eventually proposed specific legislation on this controversial issue will never be known. He died in December 1939.

Earle H. Clapp
Militant Acting Chief

Earle H. Clapp, who had been Associate Chief of the Service since 1935, became Acting Chief following the death of F. A. Silcox late in 1939. Dr. Clapp led the Service through some of its most trying years.

EARLE H. CLAPP

His demand for public regulation of private forest management was, if anything, more vigorous than that of Silcox. "He organized all resources of the Forest Service behind an unequivocal program," according to Colonel Greeley, "attempting even to command the personal support of service men in their local public relations."

As if this scheme were not ambitious enough, the Acting Chief proposed to increase the area of public forests by 150 million acres. Thus with 177 million acres already in the national forests, this proposal would have put into government ownership nearly one-half the nation's commercial forests. This he alleged was necessary to safeguard the forest economy. It was also calculated to give government economic control of the forest products industry.

An interesting doctoral thesis could be written on the testimony presented by Dr. Clapp before the Joint Congressional Committee of Forestry at several hearings during the early months of 1940. The Forest Service's program was as comprehensive as any that had been proposed to Congress and the American people to date. Its essence was public and private cooperation in every conceivable aspect of forestry effort, including financial credits. But its keynote was regulation and on that contro-

versial base it never won complete acceptance.

But the Acting Chief did not cease to act. He later tried, in 1942, to induce President Roosevelt to force compliance with Departmental—that is to say, Forest Service—regulations on timber cutting by order of the President under his emergency war authority. The pretext was that this device would increase the volume of forest products urgently needed for war. But actually it was estimated to have just the opposite effect, as a group of foresters and others advised the Director of the War Production Board. Nothing came of the proposal.

It was during this period that the Forest Service was subjected to a form of harassment that sorely tried its morale and *esprit de corps*. This was the heavy-handed attempt of the irascible Harold Ickes, Secretary of the Interior, to have the Forest Service transferred from Agriculture to his department. Mr. Ickes' plans came to nought, but in defeating him the Forest Service, and its friends, spent much time and energy that properly could have been devoted to more important matters.

It is generally believed that Dr. Clapp's militant resistance to Mr. Ickes' schemes cost him the title of Chief of the Forest Service.

Nowhere in the annals of forestry is there a parallel to the anomalous, not to say paradoxical, situation that existed during these years. On the one hand, the Forest Service under the driving insistence of its Acting Chief was alienating friends in industry and in the states by its uncompromising fight for federal regulation. On the other hand, the Forest Service under the selfless leadership of this same Acting Chief was winning friends in industry and the states in its courageous fight to resist transfer to the Department of the Interior. In its latter manifestation the Forest Service had deserved success.

Lyle F. Watts
Exponent of Regulation

Lyle F. Watts, another experienced Forest Service career officer, was appointed Chief in January 1943.

Understandably at that time much of the Service's activities were oriented toward the war effort. Personnel to the number of some 2,000 took leave to enter the armed forces. Through his personal interest Mr. Watts gave support to the numerous projects in which the Service was cooperatively engaged with other federal agencies, military and civilian. In the production of critically needed forest products for war and for essential civilian uses, the Forest Service materially aided the War Production Board, as, for example, through the Timber Production War Project.

In 1944 was passed the Sus-

LYLE F. WATTS

tained-Yield Forest Management Act. It provided for cooperative federal-private sustained-yield units under which federal stumpage could be sold to responsible purchasers without competitive bidding, in order to support communities and industries dependent on the federal forest resource.

Other legislation adopted during this period provided funds for advancing the nation-wide forest survey and increased appropriations for cooperative fire and reforestation programs with the states. In 1950 was passed the Cooperative Forest Management Act which expanded and replaced the earlier Norris-Doxey Act to provide cooperation between the Department of Agriculture and the states in providing technical services to private land owners.

One piece of legislation that was to have happy consequences in improving cooperation between the federal and state governments and private land owners was the Forest Pest Control Act of 1947. In essence, the act established the policy that the government had responsibility to protect all forest lands regardless of ownership from destructive insects and diseases.

The Timber Resource Review, a comprehensive appraisal of the forest conditions in the United States, was started early in 1952. More than a year was spent in planning this tremendous project. Much credit is due Mr. Watts for getting it off to a start in the face of frustrating misunderstandings and opposition by outside groups doubtful, if not suspicious, of its purpose.

As chairman of the advisory committee on forestry for the Food and Agriculture Organization of the United Nations, Mr. Watts helped organize the Forestry Division of FAO. During his term as Chief he participated in a number of international conferences on forestry and natural resources.

On the domestic policy front, much of the energy and time of the Forest Service and its Chief was directed toward promoting the principle of regulation. Several states passed laws regulating forest practice, including cutting, with only token opposition from timber owners. The U. S. Supreme Court upheld the constitutionality of the law passed by the State of Washington. Lawyers who looked into the matter were of the opinion that a federal law, if passed, would likewise be upheld by the Supreme Court. But despite the single-minded devotion of Mr. Watts and others in expounding the need for federal regulatory legislation, none was passed.

In summary, when Mr. Watts retired in June 1952 regulation had been in controversy for three decades. Under Silcox, Clapp, and Watts the Forest Service had gone all out in its propaganda. Although the Service lost friends in its drive

for regimentation, it also gained many by reason of its increasingly active role as a cooperator with the states, with industry, and with private land owners. It was, in short, a period of stress, one that historians of the future will find worthy of study.

With Mr. Watts' retirement, "regulation" became a taboo word, seldom mentioned by Forest Service officers and all but forgotten as a national issue.

Richard E. McArdle
Leader in New Directions

In July 1952 the lengthening shadow of Franklin B. Hough fell on Richard E. McArdle, the eleventh Chief of the Forest Service. He could not have taken office at a more fortuitous time. A forester of his professional stature, equitable disposition, and compromising ability was needed.

The Eisenhower administration having been installed, there was in evidence a reversal of viewpoint on the role of the federal government in business and states relations. Not to put too fine a point on it, public regulation of private forest practice was not only a dead issue, but, both inside and outside government, an unpopular one. And however much certain diehards may have deplored the immediate deemphasis of this issue, the Service by ceasing to advocate it gained a needed respite enabling it to get on with other essential business.

But the Service has not lacked for issues, some of which have been thrust upon it. One of these, as yet unresolved, is the so-called wilderness controversy. This arose out of legislation introduced in Congress that would adopt a national policy on wilderness, specify procedures for the establishment of wilderness areas and the uses to be permitted therein. The only wilderness areas that have been established to date are in national forests and total 14.5 million acres. These have been created by action of the Secretary of Agriculture on the recommendation of the Chief of the Forest Service.

To resume our chronology, two developments of more than passing interest occurred early in McArdle's incumbency. In 1952 a Forest Research Advisory Committee was set up to advise the Service on its research program. And in 1953, research and control activities on forest insects and diseases, a phase of forest practice no less important than protection from fire, were transferred to the Service from other agencies in Agriculture.

In 1955 the 50th anniversary of the establishment of the Forest Service as a bureau in the Department of Agriculture was observed by conservation organizations and friends of the Service throughout the nation. Part of the celebration was a golden anniversary dinner, held in Washington, D. C., sponsored by the Society of American Foresters and The American Forestry Association.

A major break-through in the long, and often discouraging, search

RICHARD E. MCARDLE

for better techniques for fire control was the first practical application in 1956, by the Forest Service and cooperating agencies in California, of the dropping of water and chemicals, from specially designed airplane-tankers, on forest and brush fires.

A year later, with the approval of Congress, the Service launched "Operation Outdoors," a five-year program to improve recreation facilities in the national forests.

In 1958 was published *Timber Resources for America's Future*, the report of the Timber Resource Review started six years earlier. Monumental in scope, it examined in depth the current status and projected future of the nation's wood supplies. According to Dr. McArdle, "The report should convince the reader that the United States is not faced with an acute timber shortage. There is no 'timber famine' in the offing although shortages of varying kinds and degrees may be expected."

When, in 1960, the Multiple Use-Sustained Yield Act was passed it gave congressional confirmation to a long-established Forest Service policy. Briefly, this act declared that the national forests were to be administered for recreation, and for the sustained yield management of range, watershed, wildlife and fish, as well as for timber.

Fifty years of forest products research was commemorated in June 1960 with the observance of the golden anniversary of the world renowned Forest Products Laboratory at Madison, Wisconsin.

Then in August of the same year was held the Fifth World Forestry Congress in Seattle with 2,000 participants from 68 nations, the largest meeting ever devoted to forestry. Its central theme was "multiple use of forest lands." McArdle was president of the Congress.

Dr. McArdle has now been Chief of the Service for nearly a decade. Most of its accomplishments during this period are known to those contemporaneously observing it. Hence, no further cataloging of events, laws, and similar developments need be attempted in this paper.

Summing up, I think of the chiefs of the Forest Service as sincere men whose loyalty to the public welfare has not been exceeded by the heads of any other agencies of the federal establishment. Notable and always manifest is their preoccupation with what they believed at the time to be the important needs of the nation. Diverse as their several personalities have been, in each there is to be found strong evidence of what, for want of a better term, might be called a sense of obligation to society.

In short, although they have been men of the forests, their ultimate dedication has been to people. And that is as it should be, for of all resources, the most important is the human resource.

Shortleaf Pine Direct-Seeding Success Affected by Month of Seeding, Release Method, and Weather

Robert E. Phares and
Franklin G. Liming

INTRODUCING shortleaf pine (*Pinus echinata* Mill.) by direct seeding is one way to improve the composition of low-quality oak stands on pine sites in the Missouri Ozarks. Shortleaf pine is one of the most valuable timber species in this area —it grows fast and begins to yield high-quality products at an early age. Where there is an adequate shortleaf pine seed source, productivity can be increased by increasing the rate of natural pine regeneration. But on areas without such a seed source, pine must be established artificially if satisfactory stocking is to be attained in a reasonable length of time.

Successful planting techniques have been developed for increasing the stocking of pine in oak-pine stands and for converting low-quality oak stands to pine. But planting costs are high. So in 1941 the Central States Forest Experiment Station, in cooperation with the Mark Twain National Forest, began to investigate the use of direct seeding to overcome the high cost of planting. The results of one of these studies show that seeding success is influenced by month of seeding, method of release, and weather during the first year.

The Study

Description of study area.—Experimental seedings were made on three blocks of four 1/10-acre plots located within a 1½-square-mile area on the Willow Springs Ranger District of the Mark Twain National Forest in Howell County, Missouri. The stands on all three areas were similar at the time of treatment and consisted mainly of poor-quality hardwoods (Fig. 1A). Predominant species were blackjack oak (*Quercus marilandica* Muenchh.), post oak (*Q. stellata* Wangenh.), black oak (*Q. velutina* Lam.), and hickory (*Carya* spp.). The 400 to 500 overstory trees per acre were about 45 years old and averaged 37 feet in height and 6.0 inches d.b.h. The understory was sparsely stocked with oak and hickory.

Slope on this area ranges from 1 to 8 percent and aspect from north to southeast. The soil type is medium cherty, Clarksville loam derived from impure limestone. The area had not been burned for about 8 years and a 1-to-2 inch layer of litter had accumulated. Depth of the A_1 horizon averaged about 1 inch.

Methods of release.—In December 1941, all 1-inch d.b.h. and larger trees on two plots in each block were girdled by removing a 3- to 6-inch-wide band of bark, cambium, and thin layer of sapwood about 3 feet above the ground (Fig. 1A). On another plot in each block, all trees 1-inch d.b.h. and larger were cut off, leaving a 6- to 8-inch-high stump. Tops of felled trees were trimmed and the slash removed from the plots (Fig. 1B). Trees in the remaining two plots in each block were girdled or cut in December 1942. Each plot was surrounded by a half-chain isolation strip that was treated the same as the plot.

Seedings.—The seed used was collected in the fall of 1941 from trees in the general area of the study. Cutting tests showed that soundness averaged between 75 and 80 percent. Three-fourths of the seed was kept in dry, cold storage until used. The rest was stratified in small cheesecloth bags between layers of moist, acid peat in sealed containers. These containers were kept in cold storage for about 3 months before the March seedings.

In each of the three blocks, one plot released by cutting and one plot by girdling in 1941 were seeded during the winter of 1941-1942. The remaining plot released in 1941 by girdling was not seeded until the two plots released in 1942 were seeded during the winter of 1942-1943. Seeded spots were spaced 6 feet apart, 144 per plot. In each plot spots were seeded as follows:

36 to dry seed in December
36 to dry seed in February
36 to dry seed in March
36 to stratified seed in March

The spots were prepared by removing all litter from 18-inch-square areas, loosening the soil to a depth of 2 to 3 inches in the center of each spot, and forming the loose soil into a mound about 8 inches in diameter and extending about 1 inch above the general level of the soil. It was thought the mound would reduce the chance of the spot becoming covered with litter. Fifteen seeds (about 11 or 12 filled seeds) were placed within a 4-inch circle in the center of the mound and covered lightly (less than ¼ inch) with fine soil.

Wire cones, poison bait, or repellents were not used to prevent loss of seed to birds and rodents, mainly because it was thought, and confirmed by this study, that such losses would be small.

Weather conditions.— Weather conditions at the time of the 1941 and 1942 seedings and during the first growing season thereafter

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FIG. 1A.—A closed stand of poor-quality hardwoods occupied the study site. Prior to seeding the overstory in this stand was girdled.

FIG. 1B.—A closed stand of poor-quality hardwoods occupied the study site. Prior to seeding the overstory in this stand was cut and slash removed.

were quite different (Table 1). A late fall, followed by a warm mild winter, made conditions favorable for the 1941 seeding. The ground was not frozen and the soil was dry and easy to work. The spring of 1942 was warm and with sufficient moisture for good germination of the seed and growth of the 1941 seedlings. Rainfall was above average throughout most of the summer months.

In contrast, adverse weather set in early the winter of 1942 with snow and cold before the December seeding. The ground was frozen and the soil hard to work so that some difficulty was encountered in the 1942 seeding. Cool, wet conditions prevailed in the spring of 1943, but rainfall from July through September was much below average and drought was evident.

Results and Discussion

Release by girdling better than release by cutting.—More seedlings became established where overstory trees were girdled the same year of seeding than where cut or girdled the year before seeding (Table 2). This was due to a higher initial catch plus better first-summer survival of seedlings. Results were similar in both years, but differences in stocking between release methods were greater in the 1942 seedings (dry year) than in the 1941 seedings (wet year).

The higher initial catch of seedlings on girdled areas may have been due to better germination, but it is more probable that it was due to better survival of seedlings between seedling emergence and the first spring observation. Hot, dry periods of only one or two days are known to seriously reduce stocking of very young seedlings. If such a period had occurred (and probably did), the shade from the girdled trees would reduce seedling mortality from desiccation and insolation by lowering soil surface temperatures.

First summer survival was also favored by the shade from the girdled trees. This advantage was not as great in the plots released

TABLE 1.—RAINFALL FOR THE GROWING SEASONS OF 1942 AND 1943 AND THE AVERAGE FOR THE 37-YEAR PERIOD BETWEEN 1918 AND 1954[1]
(In inches)

Month	1942	1943	Average (1918 to 1954)
April	4.36	3.67	4.46
May	7.18	10.66	5.10
June	5.94	4.57	4.58
July	1.46	1.82	3.02
August	4.10	.54	3.66
September	3.96	1.44	3.58
Total	27.00	22.70	24.40
Total for April 1 to May 31	11.54	14.33	9.56
Total for June 1 to Sept. 30	15.46	8.37	14.84

[1]Based on records from Mountain Grove and Birch Tree, Mo.; weather stations about 25 miles from the study area.

TABLE 2.—INITIAL SEEDLING CATCH AND SUBSEQUENT STOCKING BY YEARS OF SEEDING AND METHODS OF RELEASE (MONTHS OF SEEDING COMBINED)

Years of seeding and methods of release	Spring of first growing season	Fall of first growing season	End of third growing season	End of study period (1956)
	STOCKED SPOTS (Percent)			
1941 seedings				
Cut	90	84	77	72
Girdled	93	93	89	82
1942 seedings				
Cut	38	24	20	18
Girdled	55	50	41	35
Girdled in 1941	52	25	13	11
	SEEDLINGS PER STOCKED SPOT (Number)			
1941 seedings				
Cut	4.2	3.9	—	2.2
Girdled	5.6	5.3	—	2.4
1942 seedings				
Cut	2.3	1.7	—	1.4
Girdled	3.0	2.8	—	1.7
Girdled in 1941	2.4	1.6	—	1.2

one year before seeding because trees did not leaf out the second year after girdling as they did the first year. Moreover, a rank growth of weeds and grasses developed in all plots the second year after release which offered severe competition to the tender germinating seedlings in the plots prereleased by girdling.

Because of the better seeding success obtained with release by girdling immediately followed by seeding, it should be favored over release by cutting or prerelease by girdling where practicable.

Best results obtained with earliest seeding.—December had an edge over February and March as the best month for seeding. December-seeded seedlings emerged first and became better established than those seeded during the other two months. As a result, there were more December-seeded spots stocked (i.e. containing at least one seedling) during the first year than February- and March-seeded spots (Fig. 2 and Table 3).

The advantages of early seeding were more evident in the 1942 seedings (dry year) than in the 1941 seedings (wet year). First-year stocking of 1942 December-seeded spots was much better in relation to the other two months than 1941 December-seeded spots. This was partly due to greater differences in initial catch, but mostly to much better first-summer survival. Their earlier emergence made the December-seeded seedlings better able to withstand the summer dry periods. In the wet year, first-summer survival was excellent for all months of seeding.

Stocking after the first year continued to be better for December-seeded spots. This was mainly a reflection of the pattern set during the first growing season. Therefore, the better results obtained indicate that direct seeding shortleaf pine in December is more likely to be successful than if done during February or March.

Weather conditions during first year affect seeding success.—Because the weather was so different after the two seedings it was possible to observe the influence of weather on seeding success. The warm, moist spring of 1942 in contrast to the cool, wet spring of 1943 favored germination of the 1941 seeds and minimized seedling mortality caused by damping-off fungi. Thus, the 1941 seeding resulted in better stocking the first spring after seeding than did the 1942 seeding (Tables 2 and 3). Moist weather continued throughout the summer of 1942 resulting in better first-year survival of the 1941 seedlings than of the 1942 seedlings. The latter suffered a dry summer following seeding. Also, the 1941 seeded spots had better chances of remaining stocked during the first summer and in succeeding years because of the larger number of seedlings per stocked spot in the spring.

It is evident that first-year weather conditions can greatly influence seeding success of shortleaf pine on forest sites. In fact, greater differences in seedling establishment and survival were observed between seeding years than between methods of release or among months of seeding.

Success of direct seeding is indicated at end of first year.—The first growing season was the most critical period for establishment and survival; so, the success of the direct seedings was fairly well indicated by the end of the first year. Maximum stocking was reached by the spring following seeding. The greatest subsequent loss of stocked spots occurred during the first sum-

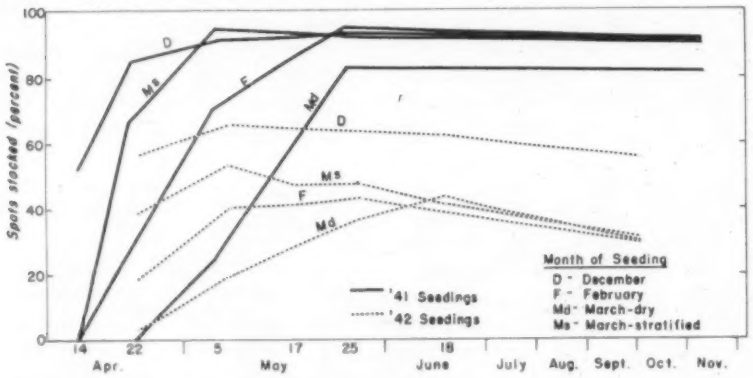

FIG. 2.—Percent of spots stocked during the first year after seeding, by months and years of seeding. (Plots released and seeded same year combined.)

TABLE 3.—INITIAL SEEDLING CATCH AND SUBSEQUENT STOCKING BY YEARS AND MONTHS OF SEEDING (PLOTS RELEASED AND SEEDED SAME YEAR COMBINED)

Years and months of seeding	Spring of first growing season	Fall of first growing season	End of third growing season	End of study period (1956)
	STOCKED SPOTS (Percent)			
1941 seedings				
December	94	91	87	81
February	95	91	85	79
March-dry	83	81	71	63
March-stratified	93	91	88	84
1942 seedings				
December	63	56	51	41
February	39	30	28	23
March-dry	44	29	22	20
March-stratified	42	31	22	19
	SEEDLINGS PER STOCKED SPOT (Number)			
1941 seedings				
December	4.9	4.6	—	2.4
February	5.5	5.1	—	2.3
March-dry	3.8	3.7	—	2.0
March-stratified	5.4	5.1	—	2.5
1942 seedings				
December	3.1	2.7	—	1.8
February	2.6	2.4	—	1.6
March-dry	2.3	1.8	—	1.5
March-stratified	2.5	2.1	—	1.4

mer, although there was some loss of stocked spots during the second and third growing seasons. After the third growing season there was little change in stocking.

It is apparent, then, the main problem in direct seeding shortleaf pine on forest sites is to obtain satisfactory stocking by the end of the first year. If this is attained, direct seeding should be successful.

Height growth. — December-seeded trees were the tallest and March-dry-seeded trees were the shortest in both the 1941 and 1942 seedings. The trees on the girdled area were as tall as those on the clearcut areas. There was a close direct relation between height of the dominant tree in a spot and number of living trees in that spot, primarily because there are better chances of one tree being a fast grower in the denser stocked spots. Statistical tests show that if the stocking variable were eliminated, there would be little difference in height growth among trees seeded during the various months. In other words, the differences in tree heights among months of seeding are apparently due to stocking differences. Nevertheless, because stocking was greatest in spots seeded during December, it follows that December seeding will probably produce the tallest trees.

Summary

Research in direct seeding shortleaf pine in the Missouri Ozarks shows that better success was obtained where seeding immediately followed removal of overstory trees by girdling rather than by cutting or by girdling one year before seeding. Also, seeding in December resulted in the establishment of more trees than seeding in February or March. Although seeding success varied greatly by years, release by girdling immediately followed by December seeding gave the best consistent results. Good stocking of seedlings in the first year assured the success of the seeding and also favored height growth of the seeded trees.

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Land and Water Use Symposium

With Special Reference to Mountain and Plains Regions
Section O, American Association for the Advancement of Science
in Cooperation with Other Societies
Grand Ballroom — Denver Hilton Hotel
Denver, Colorado — December 27 and 29, 1961

DECEMBER 27

I. *Land and Water Resources*
(9 a.m. to 12 noon)

Chairman: Roland Renne, Montana State University.

1. Population Demands for Land and Water Resources of the Western Hinterland. S. C. Smith, University of California.
2. Land Resources and Potential Use. R. D. Hockensmith, Soil Conservation Service.
3. Water Resources, Development and Uses. W. I. Palmer, Department of the Interior.
4. Public Grazing Lands in the Economy of the West. M. L. Upchurch, Economic Research Service U. S. Dept. of Agriculture.

II. *Optimum Uses for Resources*
(1:30 to 4:30 p.m.)

Chairman: E. F. Frolik, University of Nebraska.

1. Criteria and Planning for Optimum Use. E. N. Castle, Oregon State University.
2. Economic Priorities on Water Use in Arid Regions. Nathaniel Wollman, University of New Mexico.
3. Agriculture as a Competitive Segment of Multiple Use. B. D. Gardner, Brigham Young University.
4. Recreation as a Competitive Segment of Multiple Use. Marion Clawson, Resources for the Future, Inc.

DECEMBER 28

A General Symposium

For the American Association for the Advancement of Science, as arranged by the Committee on Desert and Arid Zones Research, Southwestern and Rocky Mountain Division, AAAS, and Section O of the Association

I. *Water and Climate*
(9 a.m. to 12 noon)

1. Climatography of the United States. Paul R. Julian, University of Colorado.
2. Water Capture and Methods of Increasing Supplies. John W. Harshbarger, University of Arizona.
3. Weather Modification. Earl G. Droessler, National Science Foundation.
4. Legal aspects of a National Water Code.

DECEMBER 29

III. *Impact of Public Policy on Land and Water Use*
(9 a.m. to 12 noon)

Chairman: W. E. Morgan, Colorado State University.

1. The Government's Responsibility for Land and Water. L. B. Leopold and R. L. Nace, U. S. Geological Survey.
2. Problems and Policies Associated with Wilderness Areas and Other Reserves of Public Lands. C. R. Gutermuth, Wildlife Management Institute.
3. Problems Growing Out of the Spaciousness of the West. M. M. Kelso, University of Arizona.
4. Public and/or Private Investment in Resource Development. W. E. Folz, University of Idaho.

IV. *Projecting Management Programs*
(1:30 to 4:30 p.m.)

Chairman: R. E. Hodgson, Director, Animal Husbandry Research Division, Agricultural Research Service.

1. Providing for Multiple Use in Managing Land and Water. J. A. Hopkin, Bank of America.
2. Modifying Management and Vegetation of Watershed Areas for Improved Water Yields. F. H. Kennedy, U. S. Forest Service.
3. Management Associated with Complex Use for Wildlife, Livestock, and Recreation. A. L. McComb, University of Arizona.
4. Managing Private Lands in Relation to Changing Uses of Public Lands. N. Keith Roberts, Utah State University.

Changing Pattern of Cycles in Lumber Production

Walter J. Mead

THE PURPOSE of this paper is to analyze the cyclical behavior of lumber output generally and for Douglas-fir lumber in particular. Attention will be directed to the cyclical behavior in lumber output in two different periods, the period between the two world wars and the post-World War II era. An explanation will be developed to account for the observed change in cyclical behavior.

The analytical method employed in this research is that developed by the National Bureau of Economic Research. This method allows cyclical patterns in any time series to be analyzed into short cycles beginning at the trough of each cycle, moving through additional stages to a peak and then through further stages terminating in the closing trough. Several cycles in any given time series are then averaged together to obtain what may be called a composite or average pattern of cyclical behavior for a given series.

There are limitations to the economic data which must be subjected to analysis. During the post-World War II period there have been only three business cycles marked from trough to trough. A fourth cycle is presently in the recession phase. Some of the lumber production data is rendered meaningless by strikes in the lumber industry which disrupted production. Unhappily, the 1945 and 1954 recession troughs correspond with severe strikes in the Pacific Northwest lumber industry. The analysis must, therefore, exclude data for the months involved in the strikes. But data is never completely satisfactory for analytical purposes and the reader is asked to keep the necessary reservations in mind. As will be pointed out later, though data are short the logical relationships bearing on lumber production support the limited empirical data.

This paper is divided into three parts. Part I is an analysis of the observed cyclical behavior in the lumber industry. Study will be centered on the behavior pattern for lumber production in two periods: (1) the interwar period of 1919-1938, and (2) the post-World War II period of 1945-1960. In Part II an explanation will be offered for the observed behavior pattern. And in Part III conclusions will be drawn.

I. Analysis of Cyclical Behavior in Lumber Production

The time series in lumber production.—The lumber industry has long been recognized as sharing the boom and bust characteristics of durable goods. The great depression reaching a trough in 1933 was particularly severe for the lumber industry. This may have been due to coincident troughs for a long cycle in the building industries and the standard short cycle in business. Professor Zivnuska analyzed fluctuations in lumber production for the interwar period and concluded that "reference cycle patterns show a direct correspondence between changes in the volume of lumber production and business cycles" (*14*, p. 97).

The cyclical character of lumber production is shown in Figure 1. For the period 1919 through 1938, Figure 1 shows, as Zivnuska had indicated, that peaks and troughs in general economic activity correspond closely with peaks and troughs in lumber production. Lumber production goes through rather sharp declines during a recession or depression. However, Figure 1 also shows that in the post-World War II period a different pattern of cyclical behavior developed. There is no longer a clear correspondence between peak and trough in the economy and similar points in lumber production. In the 1948-1949 recession, lumber production was three percent higher at the 1949 cyclical trough than at the preceding 1948 peak. In the 1953-1954 recession, production remained approximately constant from the 1953 peak to the beginning of the 1954 strike, coincident with the 1954 trough. In the short 1957-1958 recession, lumber production declined by only five percent from peak to trough. At the time of writing, the present recession trough has not been identified.

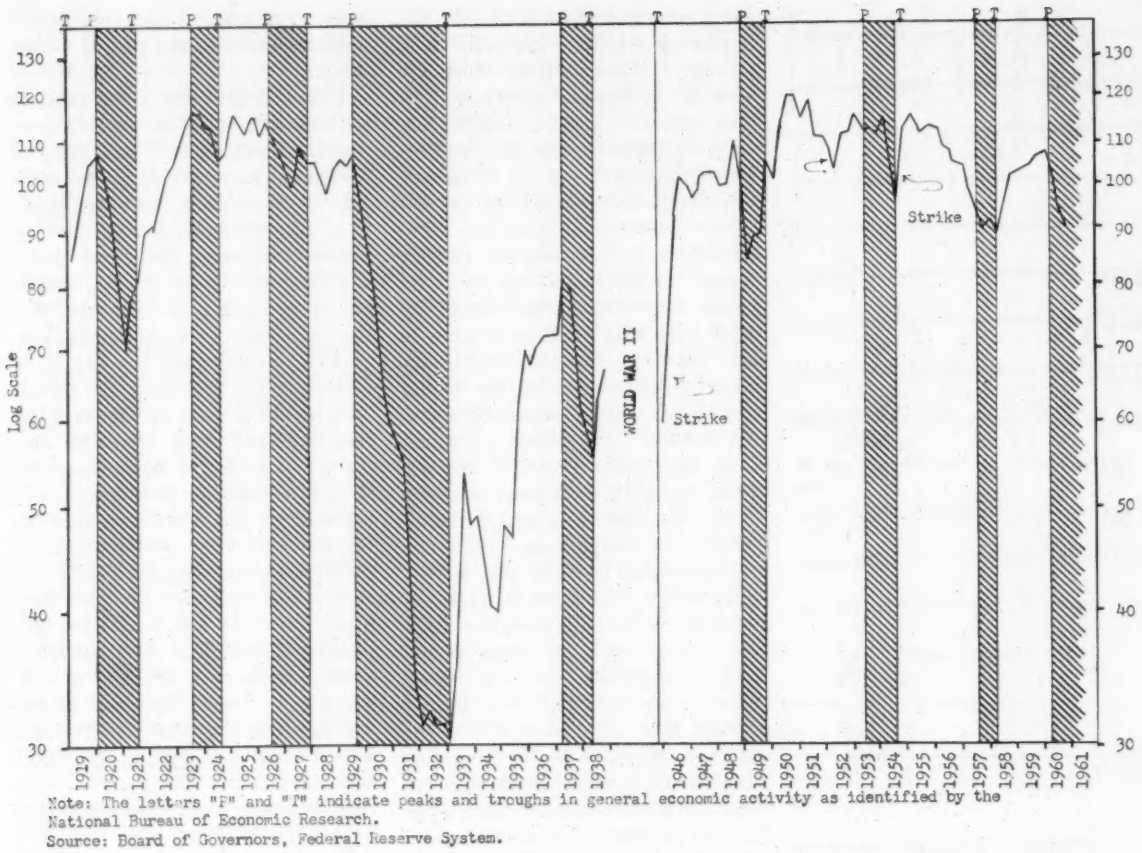
In the later expansion phase[1] leading up to a peak in a business cycle, lumber activity, rather than expanding with most other economic series as was the case during the interwar period, moved to significantly lower levels prior to the 1953 and 1957 peaks. Prior to the 1948 and 1960 peaks, the decline in lumber production preceded general economic activity by only one quarter.

A further characteristic of the lumber production cycles showing a variation between the two periods under study is the degree of

THE AUTHOR is associate professor of economics at the University of California, Santa Barbara.

Research for this paper is part of a larger study of the economics of the Douglas-fir lumber industry being conducted by the author, and was assisted by a grant from the Bureau of Business and Economic Research, U.C.L.A.

[1]The term "later expansion phase" refers to a period beginning with the return to full employment, arbitrarily set at twelve months after a cyclical trough, and extending to the ensuing peak. Generally, this period will be characterized by inflationary pressures reflected in a rising consumer price index.



Note: The letters "P" and "T" indicate peaks and troughs in general economic activity as identified by the National Bureau of Economic Research.
Source: Board of Governors, Federal Reserve System.

FIG. 1.—U. S. lumber production. (Quarterly, seasonally-adjusted, 1947-1949 = 100).

fluctuation. The range of fluctuation associated with business cycles is much less severe in the post-war period than in the interwar period, perhaps because of the lack of correspondence recently between peaks and troughs in the general economy and similar points in the lumber industry. The absence of a "long cycle" trough in this period may also contribute to the explanation. The pattern of cyclical behavior needs now to be subjected to more refined procedures of cyclical analysis.

National Bureau of Economic Research method of analysis.—The National Bureau of Economic Research (NBER) in carrying on its exhaustive analysis of business cycles has developed an analytical method that will be employed here. Generally, the NBER method divides the monthly data of a given series into cycles measured from trough to peak to trough in general economic activity. The individual cycles are then averaged together to obtain a single composite (average or representative) cycle for the series being analyzed. The resulting average cycle is termed a "reference cycle." More specifically, the NBER method of analysis is as follows:

1. The raw data are seasonally adjusted.

2. The seasonally adjusted data covering several cycles are marked off into separate cycles from the indicated troughs, peaks, and troughs in general economic activity.

3. An average value is computed for each of the separate cycles.

4. "Reference cycle relatives" are then computed by expressing all monthly values separately for each cycle as a percent of the average for each cycle.

5. Each separate business cycle, marked from trough to peak to trough, is then divided into nine stages. Stages I and IX are represented by the three months centered on the beginning and ending troughs. Stage V is represented by the three months centered at the indicated peak in economic activity. The three stages between I and V are then divided into equal time periods. A similar process is followed for the three stages between V and IX.

6. The average value is then computed for each of the nine stages of all cycles under study.

7. Having an average value for each of the nine stages for each of several cycles, an average value is computed for all stage I's, for all stage II's, etc. The average values by stages are then plotted and represent a composite of all cycles in a given series. The plotted cycles may also be termed an average or representative cycle for the series being studied.[2]

The plotted pattern indicates generally what happens to a particular economic series during gen-

[2]For a thorough statement of the NBER method of analysis see (*2*), Chap. 2, (7), Chap. 3.

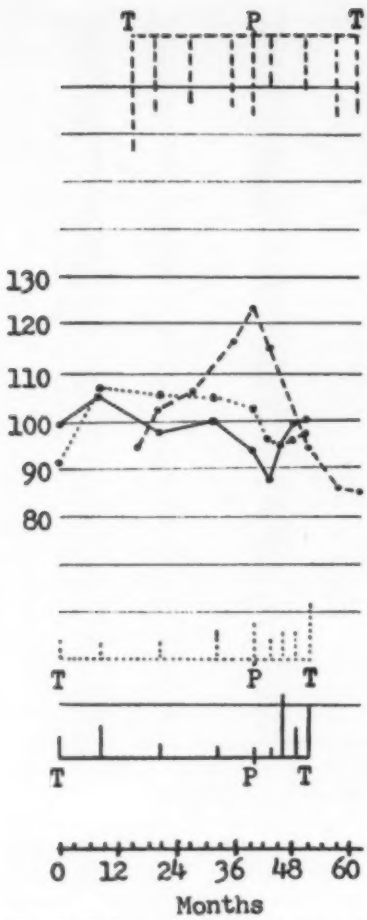


FIG. 2.—Reference cycles in lumber production; interwar and post-war periods.
----- Total U. S. lumber production[1]; 5 cycles, 1919-1938.
..... Total U. S. lumber production[2]; 3 cycles, 1945-1958.
——— Douglas-fir lumber production[3]; 3 cycles, 1945-1958.

[1]Board of Governors Federal Reserve System. Federal Reserve bulletin. October 1943.

[2]Compiled from Federal Reserve bulletin.

[3]U. S. Department of Commerce. Business statistics. Supplement to survey of current business.

eral business cycles.[3]

Cycles in total U. S. lumber production have been subjected to the National Bureau of Economic Research analytical method and the results shown in Figure 2. The average cyclical pattern shown for total U. S. lumber production in the interwar period, 1919-1938, may be interpreted as follows: The average cycle in U. S. lumber production was similar to the behavior pattern in other economic series in the U. S. economy in that lumber production reached its peaks and troughs at about the same time that peaks and troughs are identified for the total economy. Beginning with the initial trough in general economic activity, lumber production expanded from this point (stage I) to the peak of total economic activity (stage V) and then contracted to the closing trough (stage IX). The average initial trough was 6 percent below the average level of production for all interwar lumber cycles. The peak stage V was 22 percent above the average level for all such cycles, and the closing trough was 15 percent below the average. The tendency for interwar period lumber production to reach a trough slightly before the trough in general business is indicated by the leveling off between stages VIII and IX, and the rapid rise from initial stage I to stage II. Correspondingly, a slight tendency to lead at the peak is also indicated by the fact that stage IV was slightly higher than stage VI, before and after the peak in economic activity.[4] The vertical lines at the bottom of each cyclical pattern indicate the degree of deviation of each measure within any given stage from the average for that stage. The higher the vertical line the less reliable is the data. For example, the least reliable measure is the beginning trough for the five interwar cycles in U. S. lumber production. The average deviation of the five measures about their mean is 12 percent. The horizontal scale at the bottom of Figure 2 is a scale of months allowing one to estimate the average number of months from one stage to another for the composite business cycle in the period under study.

Figure 2 also shows the cyclical pattern of total U. S. lumber production in the post-World War II period during which three complete cycles have been analyzed. The average behavior of lumber production over the three post-war business cycles is quite different from the pattern revealed for the interwar period. (Comparison of two or more average cycles is facilitated by centering the peaks. This has been done in Figure 2 for the interwar and post-war periods.) No longer do peaks and troughs in lumber production correspond to peaks and troughs in the economy. The peak in lumber production for the composite cycle is reached in stage II, the first stage following the initial trough. Lumber production declines slowly through stages III, IV, and V while the general economy is enjoying prosperity up to its peak. The decline in lumber production continues after the peak in the total economy only through stages VI and VII. Then, while the economy continues its downward movement to stage IX, lumber production begins a recovery two full stages before that of general economic activity. Rapid recovery sets in from the initial trough (stage I) to stage II in the next cycle.

In analyzing the difference between interwar and post-war lumber production in terms of peaks and troughs in the general economy, the following generalization may be made: Whereas lumber production in the interwar period followed a rather typical cyclical behavior pattern, lumber production in the post-war period is significantly modified and has assumed some of the characteristics of a counter-cyclical behavior pattern.

The record of cyclical behavior in Douglas-fir lumber production for the post-war period is also shown in Figure 2. Douglas-fir lumber is the most important construction species and accounts for more than one third of all U. S. softwood lumber production. The behavior pattern of Douglas-fir production is quite similar to that

[3]The NBER method of analysis is not without its faults. It has been criticized like any average as concealing more than it reveals. This criticism, however, may be levied against every attempt to generalize and avoid simply a study of every particular instance. Another method known as "decomposing a time series" in wide use prior to the development of the NBER method appears to this writer as even less satisfactory for the purposes at hand. For some critical reviews of the NBER method see (*11*, *6*, *1*).

[4]Although it is not an integral part of the present analysis, the National Bureau method also indicates that there was a downward secular trend in the interwar period. This is indicated by the fact that the closing stage of the composite cycle was lower than the initial stage.

of total U. S. lumber production and displays roughly the same counter-cyclical characteristics. The inadequacy of data on Douglas-fir lumber production for the interwar period precludes an analysis of its interwar pattern. Presumably, however, the pattern of cyclical behavior would be quite similar to that of total U. S. lumber production for which data is available and analyzed in Figure 2.

II. Rationale for the New Cyclical Behavior Pattern in Lumber Production

Lumber production, in the absence of large changes in inventories and foreign trade, will reflect domestic demand for lumber. In the absence of a perfectly inelastic supply curve, an increase in demand (shift of demand curve to the right) will result in an increase in output. A decrease in demand will produce the opposite effect. Examination of the sectors of demand reveal that the principal use of lumber is in construction, with residential construction alone accounting for 40 percent of the total lumber produced and all construction uses accounting for 75 percent (*13*, p. 375).

A close relationship between lumber production and residential construction becomes evident in Figure 3 where interwar and post-war cycles in residential building contract awards are compared. The average of five interwar cycles, again marked off by trough, peak, trough, in general business, shows a typical cyclical pattern with a one-stage lead at peak and trough.

A similar relationship was demonstrated above between lumber production and general business activity in the interwar period. In the period following the second World War the behavior of residential building contract awards became radically different. The series developed counter-cyclical characteristics. In the three post-war business cycles, residential contract awards declined in the later expansion phase of economic activity from stage II to stage V, then declined further to stage VI. However, in stages VII, VIII, and IX while the economy was contracting, residential construction activity expanded vigorously. The expansion continued into stage II of the revival.

The shift in cyclical behavior shown in Figure 3 from an interwar pro-cyclical pattern with a one-stage lead at peak and trough to a counter-cyclical post-war pattern for residential contract awards corresponds to a similar shift in lumber production. In turn, another question is raised. What accounts for the new counter-cyclical pattern in residential building contract awards in the post-war period?

Total residential construction may be discussed under two headings: (1) government-insured construction, accounting for about 40 percent of all new financing in the 1950's and (2) conventionally financed construction, accounting for about 60 percent of the total.

In Figure 4, upper section, the seasonally adjusted monthly level of combined FHA-VA aided housing starts is plotted with cyclical peaks and troughs shown. A significant counter-cyclical pattern appears. In all three completed post-war recessions, privately owned nonfarm dwelling units started under federal mortgage assistance were at higher levels at the recession trough than at the previous peak. The post-recession recovery period was strengthened by continued expansion from this source. Then the prosperity phase preceding the next cyclical peak (a period usually characterized by inflationary pressure) was countered by a significant decline in FHA-VA aided starts.

Furthermore, this strong counter-cyclical pattern is verifiable in both the absolute level of federally assisted housing starts, and the percent of total starts (Table 1). Conventional starts expressed as a percent of total starts were conversely and necessarily pro-cyclical in all instances. In absolute terms, conventional starts behaved in a pro-cyclical manner five times out of ten possibilities. Data shown in Table 1 support the conclusion that the counter-cyclical force imparted by the federal mortgage guarantee program accounted for the observed counter-cyclical behavior of post-war residential construction.

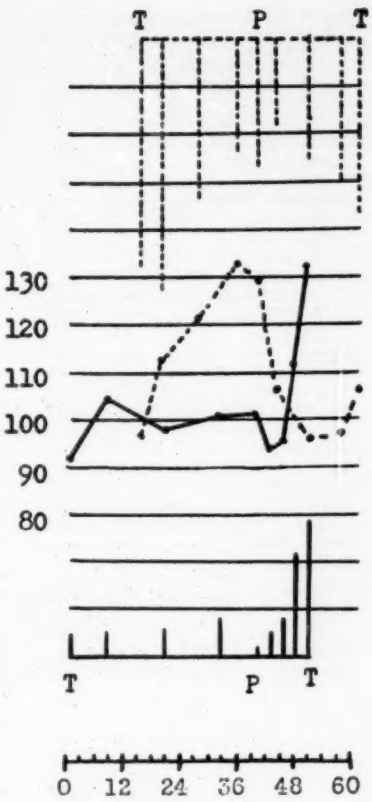


FIG. 3.—Reference cycles in residential building contract awards. Interwar and post-war periods.
Residential building contract awards-value
- - - - - - 2 cycles, 1919-1938.
——— 3 cycles, 1945-1958.

Sources: 1. Five cycles 1919-1938 from W. C. Mitchell. What happens during business cycles. New York. 1951. pp. 35, 314.
2. Three cycles 1945-1958 developed from F. W. Dodge. Corporation data, seasonally adjusted and three months moving average.

This analysis also identifies one of the important sources of counter-cyclical behavior in post-war lumber production, residential construction being an important segment of the latter. The VA mortgage guarantee program did not exist during the interwar period and the FHA insurance program, created during the "big depression," was of negligible magnitude until after the second World War.

There is very little evidence in legislation governing the activities of the Federal Housing Administration and the Veterans Admin-

TABLE 1.—CYCLICAL FLUCTUATIONS IN PRIVATELY OWNED PERMANENT NONFARM DWELLING UNITS STARTED—FHA-VA AIDED COMPARED TO CONVENTIONAL AIDED (Seasonally adjusted)

	Total FHA-VA aid		Conventional aid		
	Number of starts	Percent of total	Number of starts	Percent of total	Total starts
November 1947 (one year prior to 1948 peak)	36,760	41	52,288	59	89,048
November 1948 (peak)	24,416	35	44,829	65	69,245
October 1949 (trough)	47,830	50	48,583	50	96,413
October 1950 (end of assumed recovery period)	53,857	57	40,961	43	94,818
July 1953 (peak)	33,934	40	51,453	60	85,387
August 1954 (trough)	50,556	51	48,769	49	99,325
August 1955 (end of assumed recovery period)	56,320	53	50,688	47	107,008
July 1957 (peak)	24,501	29	60,427	71	84,928
April 1958 (trough)	26,692	33	55,461	67	82,153
April 1959 (end of assumed recovery period)	43,463	36	77,324	64	120,787
April[1] 1960 (peak)	31,950	34	62,421	66	94,371

Source: Housing and Home Finance Agency. Housing statistics. Seasonal adjustment at Western Data Processing Center. U.C.L.A.

[1]The National Bureau of Economic Research has tentatively identified May 1960 as the cyclical peak. The "old series" on housing starts ends with April data. For the latter reason, April 1960 is used as the peak date.

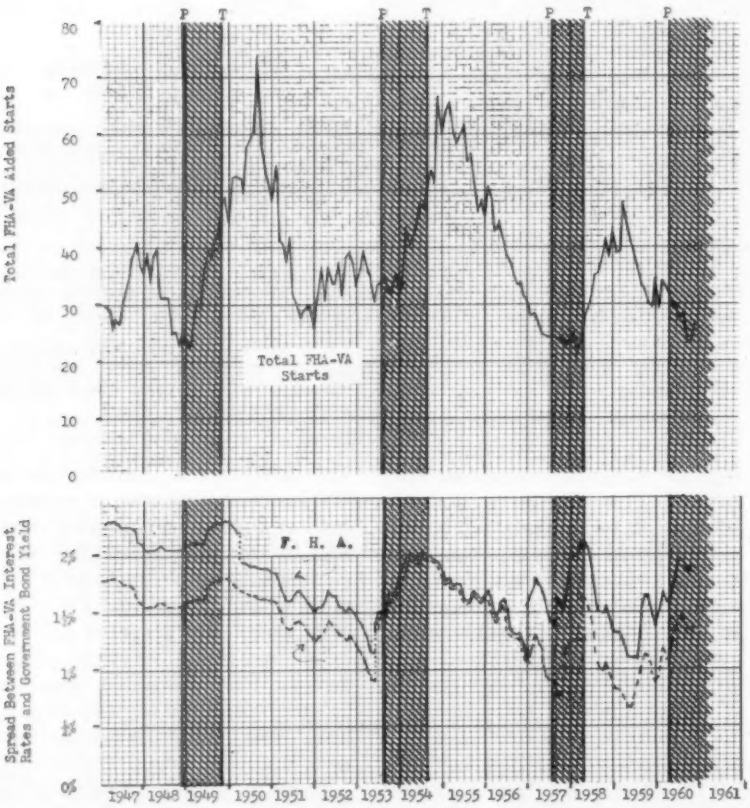


FIG. 4.—Privately-owned permanent nonfarm dwelling units started with aid (seasonally adjusted) and spread between U. S. Government long-term bond yield and FHA and VA administered interest rates.

istration to indicate that countering both deflation and inflation was an important part of the intention of Congress in writing the legislation. Neither is there any evidence that administrative changes in FHA and VA regulations concerning mortgage insurance were designed to perform a counter-cyclical function (*3*), pp. 299-300. To the contrary, more often than not the character of administrative changes in FHA-VA rules would contribute to pro-cyclical results.

Counter-cyclical results of FHA-VA activity appear to result from interest rate conditions. FHA-VA maximum interest rates on insured mortgages are rather inflexible and the discounting process is not a satisfactory substitute for interest rate flexibility.[5] During an inflationary period when the Federal Reserve System is pursuing a restrictive monetary policy, interest rates are normally rising and high. Potential suppliers of mortgage funds through FHA and VA channels do not find government insured mortgage paper attractive (*8*), pp. 5-6. Funds are therefore diverted to other alternative investments. In contrast, during a recession interest rates will be moving down and will be relatively low under stimulation of Federal Reserve "monetary ease" policies. The allowed interest rates on government insured paper remain relatively fixed, however, and the insured mortgage paper again becomes an attractive investment. Funds, therefore, flow into FHA and VA guaranteed mortgage paper during a period of recession and are diverted from this use when inflation sets in and a monetary policy of restraint is adopted by the Federal Reserve System.

The logic of this relationship is reflected in Figure 4 where total FHA-VA aided starts are compared with an interest rate factor (the spread by which the administered FHA and VA nominal interest rates exceed the yield on long-term U. S. Government bonds). One may verify from Figure 4 that when the spread is low, federally assisted housing starts are also low,

[5]For analyses of the mechanics and shortcomings of discounting see (*9*), p. 8; (*5*), pp. 15-24; and (*4*), p. 123.

and when the spread increases, housing starts increase, though an understandable lag is usually present.[6]

It appears, therefore, that the counter-cyclical character of residential construction is the result of a similar pattern in government assisted construction and the latter in turn is due to a flexible market rate of interest influenced by Federal Reserve policy periodically making a relatively inflexible nominal interest rate on insured mortgages alternately unattractive and attractive to the suppliers of credit.

III. Conclusions

The cyclical behavior patterns of lumber production have been analyzed in this paper. Lumber production was found to behave in a conventional pro-cyclical manner in the interwar period, but to have developed some counter-cyclical characteristics in the post-World War II period.

The reasons for this modification in the cyclical pattern of lumber production are found in corresponding shifts in the pattern of residential construction, housing starts having undergone a similar shift in cyclical behavior. The latter shift in turn is the result of a strong counter-cyclical pattern in the post-war mortgage assistance programs under Federal Housing Administration and Veterans Administration guarantees. Alternating periods of high and low interest rates(corresponding to periods of inflation and deflation respectively) and largely under the control of the Federal Reserve System are confronted by rather inflexible nominal interest rates allowed on FHA and VA insured mortgages. Thus, suppliers of mortgage money find FHA and VA paper unattractive when market rates of interest are high, which generally is the case during an inflationary condition. Correspondingly, the relatively attractive FHA-VA yields during periods of deflation cause suppliers of mortgage funds to increase the flow of funds into mortgages. Since FHA and VA insured mortgages accounted for about 40 percent of all new residential financing during the decade of the fifties, interest rate policy became an important influence on the cyclical pattern of residential construction and on the cyclical pattern of lumber production.

[6]For a similar discussion of the interest differential see (*12*), pp. 255-258. Factors other than differential yields are also active determinants of the volume of FHA-VA financing, though they are believed to be relatively less important. For a discussion of some of these factors see (*10*, pp. 385-387).

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Compilation of World Forestry Information to be Published in 1962

Proceedings of the Fifth World Forestry Congress, are now being published, Dr. V. L. Harper, chairman of the Executive Committee of the Congress, has announced.

Directing the compilation and editing is the Forest Service, U. S. Department of Agriculture.

The Congress, which was held in Seattle, Wash., August 29 to September 10, 1960, attracted 2,000 men and women responsible for management and protection of the world's forest resources. Of the governments invited to the Congress by the Department of State, 71 had nationals in attendance. This was the largest World Forestry Congress ever assembled, and the first held in the Western Hemisphere.

The proceedings cover a wide variety of forestry subjects, ranging from multiple use of forest lands and progress in world forestry to silviculture and management, genetics and tree improvement, forest protection, forest economics and policy, forestry education, forest products, forest and range watersheds, logging and forest operations, and tropical forestry. Also included are accounts of special events such as the planting of the International Friendship Grove on the University of Washington campus, key speeches, a list of participants, and other features.

In almost 2 million words, 449 of the world's foresters presented papers which will be included in the three volumes. They cover 1,800 pages—1,386 in English, 234 in French, and 180 in Spanish—the three official languages of the conference. In addition to the full text of each technical paper in the language in which it was delivered, a resumé will be included in the other two languages.

The printing contract for the three volumes of proceedings has been awarded, and final copy will be in the hands of the printer in January 1962.

All three volumes may be purchased for $25, the cost price, through advance orders only, placed prior to January printing with delivery later in 1962. There will be no bookstore sales. Payment must be in U. S. dollars. Postage is included in the purchase price.

A special folder describing the proceedings and their contents, with an order blank, is available. Those who wish to order may obtain the brochures with blanks from Dr. V. L. Harper, Chairman of the Executive Committee, Fifth World Congress, c/o Forest Service, U. S. Department of Agriculture, Washington 25, D. C.

Altitudinal Variation at 20 Years in Ponderosa and Jeffrey Pines

R. Z. Callaham and
A. R. Liddicoet

EARLY returns from a study of altitudinal variation of pines along an elevational transect in California indicated middle elevation sources grew best regardless of the elevation of planting, seeming to contradict the old maxim, "Local seed source is best" (*6*). Later returns bring some support for the maxim as local seed sources assert themselves after 20 years. Nonlocal seed sources do not keep up the growth pace or are hard hit by environmental factors.

The 20-year results reported here add to the earlier report some striking plantation differences on the one hand, and some interesting elevation trends on the other. Here also are 20-year data on Jeffrey pine; early performance of this species has yet to be summarized.

For 20 years, ponderosa (*Pinus ponderosa*) and Jeffrey (*P. jeffreyi*) pines from different altitudinal sources have been "pitted against one another" in a test of survival and growth. The test is limited to a narrow transect on the west slope of California's Sierra Nevada. The elevation of the 89 ponderosa seed trees ranged from 125 to 6,919 feet. Three Jeffrey pine progenies each representing a different number of seed trees were included:

Progeny	Seed trees	Elevation	
		Range	Mean
	(No.)	(Feet)	(Feet)
1	3	3,450	3,450
2	13	5,720-7,450	6,635
3	5	7,735-8,235	7,860

All progenies were grown from seed sown in 1938 at low-, medium-, and high-elevation planting sites—960, 2,730, and 5,650 feet above sea level. Other features of the study including plantation design have been described (*6*).

In the fall of 1957 every tree was measured and several characters were recorded. Height and diameter growth vary significantly with altitudinal source and with elevation of planting. For other characters, the outstanding results emerge from the highest plantation. Up high, lean and breakage of the main stem are most pronounced in low-elevation sources. All trees have more branches there than at lower plantings. Furthermore, they grow slower and retain their needles longer. The net result is a more fully-clothed, dense-crowned tree at higher elevations.

Height Growth

Ponderosa pine.—After 20 years, the influence of seed source on height had changed at the 5,650-foot plantation (Fig. 1). Elevation of seed source no longer significantly influenced growth. The growth of all sources started leveling off. We computed the curvilinear regression of growth on altitude of seed source and altitude squared. This curve still accounts for more variation in height than does a linear regression using altitude alone; however, the difference is not significant as it was after 12 years (Table 1).

Height growth at the 960-foot and 2,730-foot plantations seems to be following the course suggested by the earlier measurements (Fig. 1). Certainly the highest sources are falling farther behind. The highly significant effects of altitude and its square on height growth were shown by curvilinear regressions. Use of both independent variables also accounted for significantly more of the variation in height growth than did the use of altitude alone (Table 1).

One further observation on heights deserves mention. The progeny having 5,765 feet as the mean elevation of its seed trees grew less than the progeny having 5,555 feet as a mean parental elevation. This occurred at each of the three plantations. Four seed trees are represented in the slower growing progeny and 10 in the faster growing progeny. The mean elevation difference between these progenies is only 210 feet—not enough to account for the growth difference. Perhaps differences in microsite of the parental trees could be correlated with this genetic difference in height growth. Regardless of the forces leading to the origin of this genetic difference, here is a strong illustration that factors other than elevation must be considered in selecting seed trees. The next step needed is to examine the genetic adaptations to microsites—localized ecotypic variations (*10*).

At 20 years, evidence is appearing of inherent differences in growth curves associated with seed source elevation. Trees with low-elevation seed-parents take off rapidly. Trees with high-elevation seed-parents start more slowly; they seem to be dropping ever farther behind at low elevations. Conversely, at

TABLE 1.—RELATION BETWEEN 20-YEAR HEIGHT AND BOTH SEED-TREE ALTITUDE AND ALTITUDE SQUARED

Item	Plantation elevation (Feet)		
	960	2,730	5,650
Coefficient of multiple correlation, R	0.642[1]	0.591[2]	0.065
Superior curved line fit, F	11.068[1]	5.609[2]	1.519

[1]Highly significant; probability <.01.
[2]Significant; probability <.05.

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high elevations, as in the story of the hare and the tortoise, the local sources have caught up to the fast-starting lowlanders. Perhaps in the next 10 years they will forge ahead. This long wait for results is in sharp contrast to the quick returns realized by Squillace and Bingham (*10*). In only a few years their progeny tests showed the superiority of high- over low-elevation progenies at their highest planting site.

Jeffrey pine.—In general, Jeffrey pine, as a species, is considered to be inherently more slow growing than ponderosa pine. But recently a contradiction to this assumption appeared (*3*). In 1937 a plantation similar to these three was established in the Coast Range of California at 1,830 feet above sea level. The Jeffrey pine progenies were from the same trees as the ones in this Sierra study. At the Coast Range plantation, Jeffrey pines grew taller in 20 years than ponderosa pines from the same elevations. However, in the Sierra test, no Jeffrey pine progenies equalled ponderosa progenies from the same elevation.

However, we must note that the Jeffrey tests in the Sierra were not an integral part of the ponderosa tests. At the Coast Range planting the two species were mixed together in a randomized design. At each Sierra plantation the Jeffrey test was located along one margin of the ponderosa test; furthermore, this margin usually was a poorer site. Particularly at the middle-elevation planting, Jeffrey did not have a fair chance. Thus, the Jeffrey progenies did not have an equal opportunity with ponderosa to sample randomly the site differences within each plantation. One cannot degrade Jeffrey pine by comparing the height growth curves in Figures 1 and 2. We still do not have a rigorous Sierra test of ponderosa and Jeffrey progenies from the same elevation.

Differences in growth between the three progenies tested were highly significant at the 960-foot and 2,730-foot plantations; the progeny from the highest source grew slightly less. At the 5,650-foot plantation, progeny growth differences, although greater, were not quite significant (F=5.06) at the .05 level ($F_{.05}$=5.14).

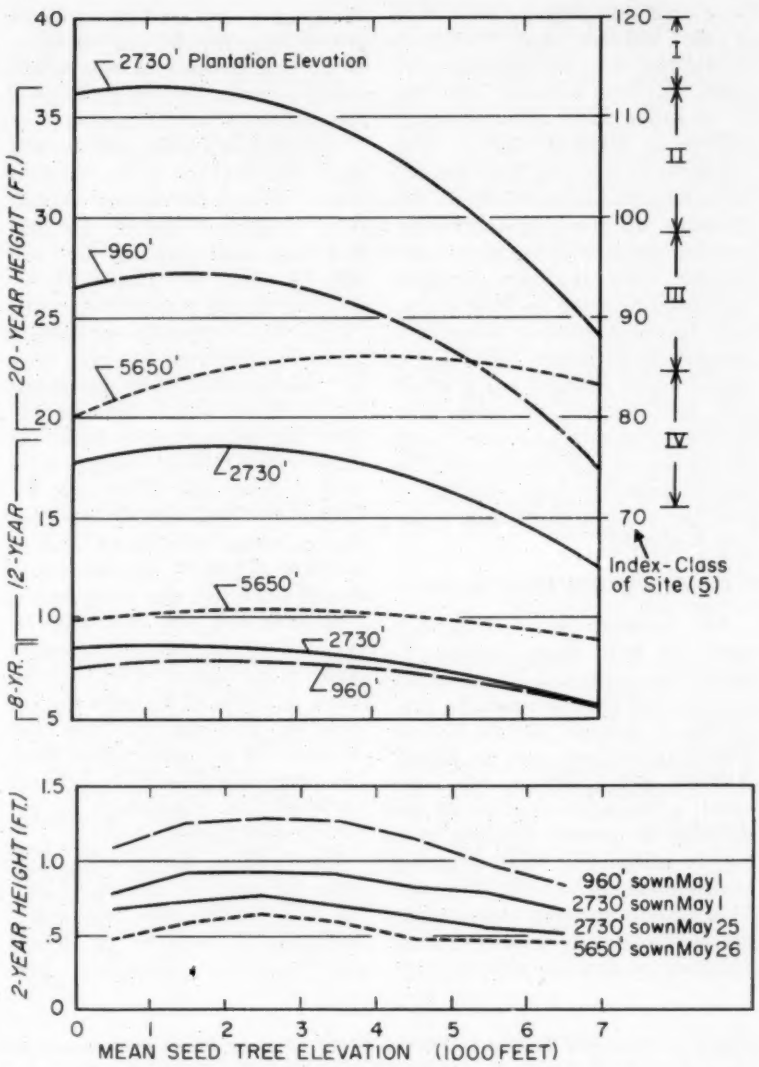

FIG. 1.—Ponderosa pine progeny heights up to 20 years of age in relation to seed tree altitude.

The performance of the highest elevation Jeffrey progeny at the lowest elevation of planting is remarkable. The parent trees were subalpine residents, but the progeny did well on a low, hot, dry site. Incidentally, their half-sib relatives were the ones which attained such an outstanding growth rate at the low-elevation plantation in the Coast Range (*3*).

In the Sierra Nevada, Jeffrey pines normally intermingle with ponderosa pines at the upper edge of the ponderosa zone and grow on up to 8,000 or 9,000 feet (*4*). Below the normal range of the species, one finds isolated pockets of Jeffrey pines. The lowest elevation Jeffrey source, 3,450 feet, was from such an isolated site where soils were derived from serpentine rocks. In

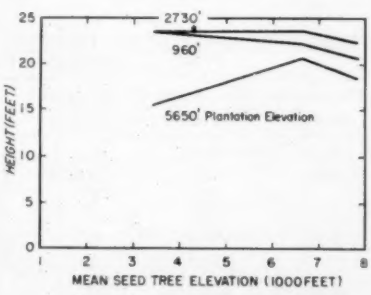

FIG. 2.—Jeffrey pine progeny heights at 20 years of age in relation to seed tree altitude.

the Sierra this progeny grew well at the 960-foot and 2,730-foot plantations on nonserpentine soils (Fig. 2). This progeny, like the low-elevation ponderosas, certainly suffered on being elevated.

Results of this test, like those of the ponderosa test, demonstrate the existence of genetically different populations at different elevations. Selective forces related to elevation have been a factor in their evolution. In the particular elevational transect under study, topographic and climatic changes are gradual and continuous. Ponderosa and Jeffrey pines exist as a continuous population on this tilted plain. The logical induction from the data is that the pattern of genetic variation is clinal.

Genetics in Site Classification

All foresters know that site varies as soils, slope, aspect, climate, etc. change. What about genetics and site? Because the conventional measure of site is tree height at a given age, as Mirov, Duffield, and Liddicoet (*6*) indicated, a forester's measure of site includes the genetic capacity of a tree to utilize and to tolerate the environment in which it grows. This genetic capacity varies as individual trees vary or as trees from different geographic sources vary. Traditional site index estimates growth capacity for native trees. What will happen to this traditional measure as nonnative trees are established in plantations?

The yield at a given location will vary with the kind of tree planted there. Using the height regressions presented earlier, we find that the same planting site can vary by one or two classes (*5*), depending on the genetic stock used (Table 2). Conversely, estimating quality of different planting sites by using genetically similar plants has its limitations. Assuming the 1,000-foot source as a basis the three plantations would have ranged from site I to site IV (Table 2). The higher elevation sources would have shown sites II to III or III to IV. One must constantly remember that every source —actually each tree—has a different kind of reaction and tolerance range to all factors of its environment. All trees of a species are not identical just because men call them all by the same name. Each tree provides a genetically different yardstick for measuring the environmental factors of site.

Furthermore, the results illustrate the need for caution in calling any planting site "uniform." Analysis of variance in height growth within elevational progenies at each plantation showed a highly significant variation due to what may be called microsite variations in the 2,730-foot and 5,650-foot plantations. The lowest plantation was rather uniform. Only because the design of this study incorporated replication and randomization were we able to obtain meaningful answers on this point.

The range of site index on each plantation after 20 years was considerable (Table 3). Ponderosa "local stock" was planted at four random locations in each plantation. The middle-elevation planting site showed the most internal variation. On this southerly exposure, the gentle upper slopes (9 percent) were significantly better, site I, than the steeper (29 percent) lower slopes, site II. This site variation occurs in a total horizontal distance of 400 feet. Incidentally, foresters faced with such rapid changes in environment will have great difficulty in finding good genotypes through phenotypic selection in wild stands. To pursue this point further, even if one finds a superior genotype in microsite III, can he expect it to be superior in a microsite I at the same elevation or a microsite III at another elevation?

Diameter Growth

Ponderosa pine.—At all three plantings, diameters at breast height showed elevational distributions similar to heights (Fig. 3). The variation in diameters due to elevation was statistically significant at the lower two plantings but not at the highest planting. At the lower plantations, high-elevation progenies grew more slowly than middle-elevation progenies, but at the upper planting they held their own and now seem to be surging ahead.

The most striking outcome was the generally large diameters for all progenies. If one determined site class by Meyer's table of diameters at age 20, every progeny at every one of the plantations would measure up to site I (4.6 inches and larger). This contrasts with the wide diversity in site as measured by heights.

The explanation seems simple. Meyer's tables are based on natural

TABLE 2.—VARIATION IN SITE INDEX AND CLASS[1] AT EACH PLANTATION DEPENDING ON ELEVATION OF SEED SOURCE USED FOR SITE ESTIMATION

Plantation elevation (Feet)	Seed source elevation—feet			
	1,000	3,000	5,000	7,000
960	94.6—III	93.4—III	86.7—III	73.3—IV
2,730	113.4—I	110.4—II	102.0—II	88.0—III
5,650	82.9—IV	85.8—III	85.8—III	83.2—IV

[1]Based on theoretical 20-year tree heights from regressions for each plantation and on Meyer's (*5*) site index (100-year).

TABLE 3.—VARIATION IN SITE INDEX AND CLASS BASED ON HEIGHT AT 20 YEARS FOR "LOCAL" PONDEROSA PINE AT EACH PLANTATION

Plantation elevation	Seed source elevation	Mother trees of progeny	Range in four progeny replications		
			Height	Site index	Site class
Feet	*Feet*	*No.*	*Feet*		
960	618	9	23.7-28.3	87.5-96.6	III
	783	1	18.9-27.1	77.4-94.2	IV⟶III
	783	1	23.5-26.0	87.0-92.0	III
2,730	2,719	5	32.2-41.3	104.4-122.6	II⟶I
	2,748	1	32.4-41.0	104.8-122.0	II⟶I
5,650	5,555	10	21.4-25.3	82.8-90.6	IV⟶III
	5,765	4	18.5-22.4	76.3-84.8	IV⟶III
	6,250	1	18.8-23.8	77.1-87.6	IV⟶III
	6,322	1	23.6-26.4	87.2-92.8	III

stands with highly variable spacing between trees. In these tests, wide, uniform spacing (8 feet) was maintained between all trees. Wide initial spacing promotes such rapid diameter growth (*12*).

Diameters, like heights, were significantly smaller on some of the adverse microsites of the upper two plantings. The range in average diameters for the four replications was:

at 2,730 feet ..... 6.59 to 7.59 inches
at 5,650 feet ..... 5.79 to 7.04 inches

Jeffrey pine.—Diameters of the Jeffrey progenies were strikingly uniform by contrast (Fig. 3). Elevation generally had little effect. Only at the highest planting did high-elevation stock approach a significant increase in diameter over the low-elevation stock.

Stem Taper

By combining the foregoing two characters, one obtains an expression of stem taper. Following Weidman (*13*), we divided mean height in feet by mean diameter in inches for each progeny.

Analyses of data for both ponderosa and Jeffrey pine show significant changes in stem taper (Fig. 4). As elevation of seed source increased, the progenies became stockier at each plantation. Between planting elevations, all sources were stockiest at the highest plantation.

What causes the significant changes in stem taper associated with elevation? In the 960- and 2,730-foot plantations, mean progeny height was closely related to diameter (Fig. 5). Tallest progenies were slimmest (form 5.0); shortest progenies were stockiest (form 4.0). Continued growth at the present relative rates may produce changes in taper, as expressed here. Data presented by Weidman (*13*) and by Squillace and Silen (*11*) show such a change over 20 years. They followed changes in dominant trees of ponderosa from three Bitterroot, Montana, sources grown in northern Idaho. Their taper values after 20 and 40 years were:

Source	*20 years*	*40 years*
4,000 feet	4.57	6.10
5,000 feet	4.68	6.37
7,200 feet	4.41	5.95

As in California, the highest elevation trees were stockiest, and the middle elevation trees slimmest. This order was maintained to age 40 in northern Idaho.

At the 5,650-foot plantation, the interaction between environment and genes produced much stockier progenies regardless of the source elevation (Fig. 5). This stockiness reflects a change in relative rates of diameter and height growth from conditions at the lower plantations. Probably temperature, moisture, and wind conditions during the periods of height and diameter growth influence this change. Future measurements from these plantations may clarify the importance and nature of genetic and environmental influences on stem taper.

Branch Number

Ponderosa pine.—In an attempt to assess the influence of elevation on limbiness, we counted the total number of limbs produced on the main axis at the first two whorls behind the leader—the branches produced in 1956 and 1957. Counts from the ground were made on the outer 12 trees in each group of 16 trees. The average total number of branches per tree for the four replications of a progeny was the statistic subjected to analysis of variance.

Elevation of planting, not source elevation, very significantly influenced the number of branches produced (Fig. 6). The average number of branches produced at the three plantations was:

Plantation	*Branches*
960 feet	6.9
2,730 feet	7.1
5,650 feet	8.4

Elevation of the seed parent did not contribute significantly to the number of branches. Only at the

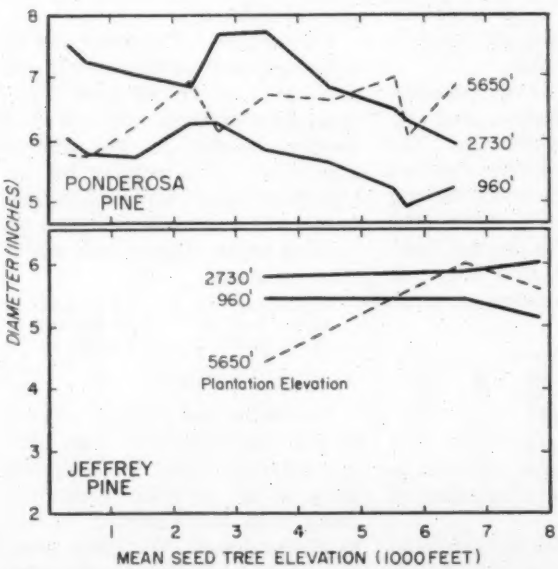

FIG. 3.—Progeny diameters at 20 years of age at three elevations of planting.

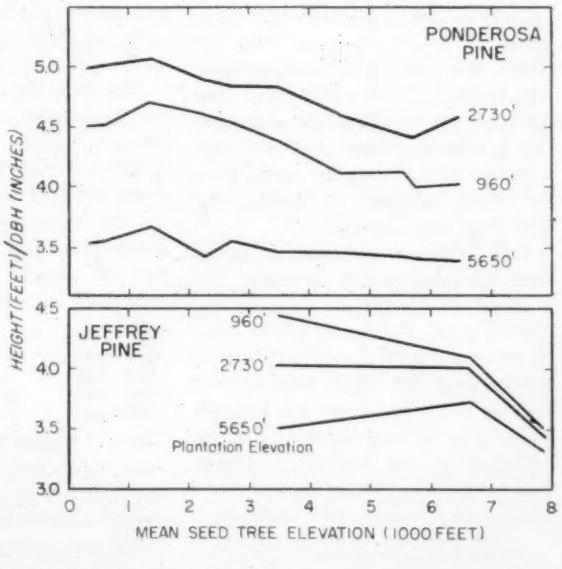

FIG. 4.—Stem form of elevational sources at three plantation elevations.

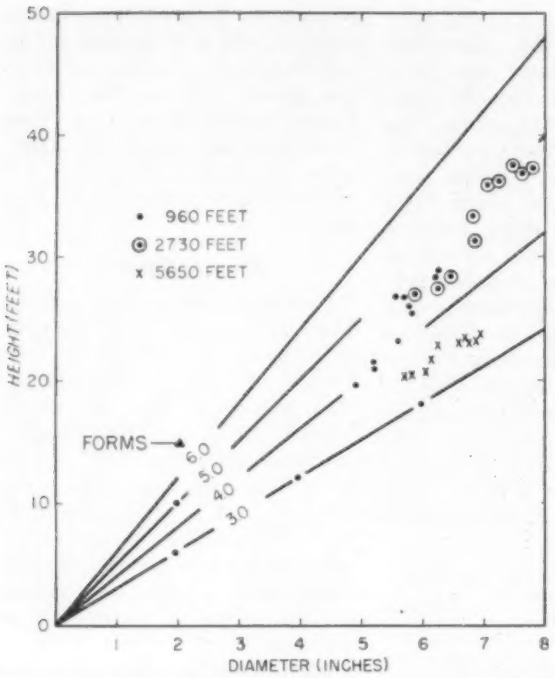

FIG. 5.—Stem form (height/diameter) for ten progenies from different elevation sources planted at three elevations.

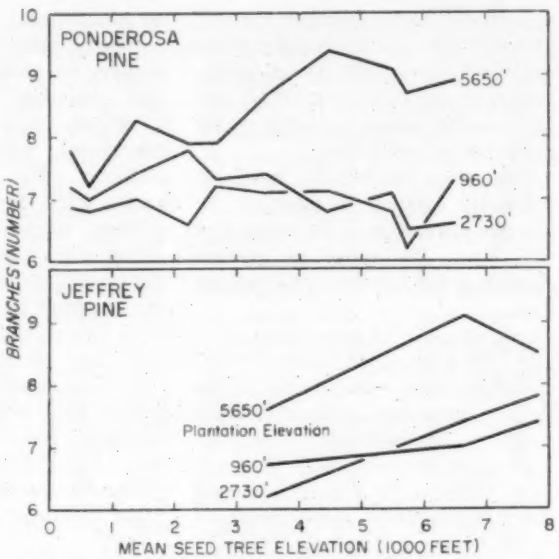

FIG. 6.—The average total number of branches produced in the 19th and 20th growing seasons at three elevations of planting.

5,650-foot plantation did the data suggest an increase in number of branches as seed source elevation rose.

One other unexplained fact was gleaned from the data by means of a sign test (*9*), comparing the number of branches produced in 1957 with the number produced in 1956. At the two lower plantings significantly more branches were produced in 1957; fewer in 1956. At 5,650 feet the 1956 complement was larger, but the difference was not significant. The test suggests (1) a strong influence of environment on branch number and (2) a variation in this influence with both year and elevation.

Jeffrey pine.—Seed source elevation did significantly influence the number of branches produced by Jeffrey pine. Progenies of the lowest sources (3,450 feet) had fewest branches at all three plantations. Just as for ponderosa, all sources produced significantly more branches at the highest planting. The plantation means were:

Plantation	*Branches*
960 feet	7.1
2,730 feet	7.0
5,650 feet	8.4

Sign tests did not reveal significant differences between the numbers of 1956 and 1957 branches.

Needle Retention

Ponderosa pine.—The 12 outside trees in each block of 16 were inspected for needle retention in the fall of their twentieth growing season. The average number of seasons of retention for 48 trees in the 4 replicated blocks at each plantation was the statistic subjected to an analysis of variance.

The relation of needle retention to plantation elevation had extremely high significance. The 5,650-foot plantation trees retained their needles nearly twice as long as the trees planted at the two lower plantings. The average number of seasons needles were retained at each plantation elevation were:

Plantation	*Ponderosa*	*Jeffrey*
960 feet	1.92	2.30
2,730 feet	2.11	2.57
5,650 feet	3.80	3.27

Many authors (*1, 2, 7, 13, 14*) have noted this longer retention in natural stands and plantations at higher elevations.

At each plantation the progenies from different elevations had uniform needle retention. The over-all average number of seasons of needle retention varied regularly but insignificantly by elevation of seed source:

4 lowest sources	2.7 seasons
4 middle sources	2.6 seasons
2 highest sources	2.5 seasons

These data provide another illustration of the low heritability and high environmental control of this character (*1, 13*).

Jeffrey pine.—The pattern of results in ponderosa pine nearly was duplicated in Jeffrey pine. Trees from all elevations retained their needles longest at the highest plantation. The regular but insignificant trend in over-all average number of seasons of retention according to elevation of seed source was reversed:

3,450 feet	2.6 seasons
6,635 feet	2.7 seasons
7,860 feet	2.8 seasons

Lean

Ponderosa and Jeffrey pines.—In their native habitats these pines normally are erect straight-boled trees. At the 5,650-foot plantation, many trees were starting to lean or to bend over. We rated every tree at each plantation according to this subjective system:

Rating	*Description*
0	No lean.
1	Slight lean, up to 5°, having very little effect on future straightness.
2	Moderate lean, 6 to 20°, perhaps having some effect on future straightness.
3	Sharp lean, 20 to 45°, probably enough to reduce commercial value.
4	Horizontal, more than 45°.

The percentage of trees from each seed source given each rating was calculated. Such statistics are not distributed normally and conventional analyses could not be followed.

Examination of the data (Fig. 7) shows a much greater incidence of lean in low-elevation progenies at the highest plantation. At the lower plantings the trend is not dominant; all sources performed about the same. Perhaps the deep snow pack with its tendency to slide downhill may be related to the more frequent lean of stems at the highest plantation.

The development of lean over the next decade will be interesting to follow. Trees will grow larger; crowns will become more crowded; the snow pack no longer will provide shelter to the crowns from winter's blasts and may push on the stems. High-elevation sources probably will stand straightest. Schmidt (*8*), in a comparable study of 17-year-old *Pinus sylvestris* L., reports that higher elevation sources had straightest stems and most rapid recovery from leader damage.

Stem Breakage

Ponderosa and Jeffrey pines.—At the 5,650-foot planting, many trees had breaks or crooks in the main stem. This damage was rated as follows:

Rating	*Description*
0	No apparent main stem breaks.
1	Slight kink—overgrown in a few years.
2	Severe kink—eventually overgrown but only after many years.
3	Major break producing dogleg as branch turns up; commercial value limited.

These ratings represented to us breakage at progressively older sections of the stem. A slight kink seemed to have resulted from the loss of a 1- or 2-year-old leader; a severe kink, the loss of perhaps a 3- to 5-year-old leader.

Only at the highest plantation was breakage prominent (Fig. 8). Lower elevation sources broke off most frequently. Why? We do not know. Perhaps this breakage may explain the changing curves of height (Fig. 1). Careful watch should be maintained over the next few decades to determine (1) if breakage is a significant factor in

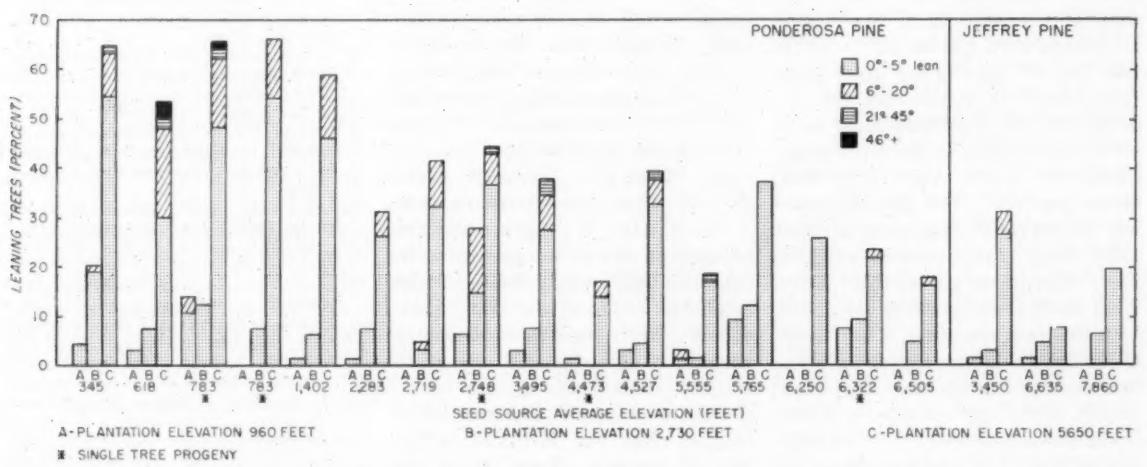

FIG. 7.—The proportion of trees in each pine progeny showing different degrees of lean.

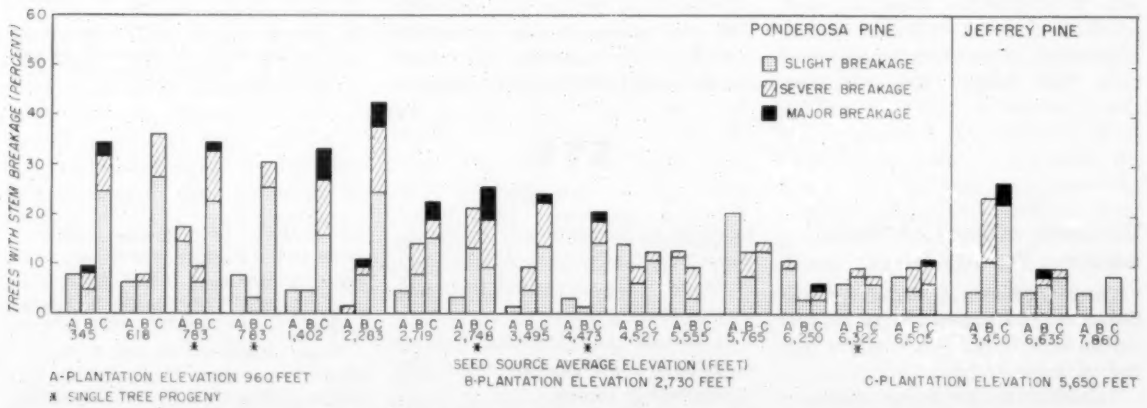

FIG. 8.—The proportion of trees in each pine progeny showing different degrees of main stem breakage.

reducing the early height superiority of middle-elevation sources, (2) what causes breakage, and (3) what effect breakage may have on final stem form.

Survival

Early plantation failures were quickly replanted; hence, the number of trees still present at 20 years (Table 4) does not reflect an accurate estimate of survival ability. Seedlings of each seed source were planted at 64 spots in each plantation. The only losses to speak of since replanting have occurred at the highest planting. The low-elevation sources seem most poorly adapted.

Summary

Progenies of ponderosa and Jeffrey pines grown for 20 years at 3 elevations show heritable differences in height and diameter growth associated with the elevation of the seed tree. Seed tree elevations varied from 125 to 6,919 feet for 89 ponderosa pines and from 3,450 to 8,235 feet for 21 Jeffrey pines. Generally local seed sources grew best at the 3 planting sites—960, 2,730, and 5,650 feet above sea level. The fastest growing 20-year-old progenies at low (960 feet) and medium (2,730 feet) elevation plantations were from seed trees growing at 1,000 to 2,000 feet elevation. They were taller than high-elevation or very low-elevation progenies. Up high (5,650 feet) the progenies from lower elevations seemed to be falling behind in height growth.

The importance of genetics in evaluating site quality is brought out. Average site class at each plantation varied by 1 or 2 classes, depending on the elevational source used for height determination.

TABLE 4.—NUMBER OF TREES SURVIVING AT 20 YEARS, BY ELEVATION OF SEED SOURCE AND PLANTING SITE

Average elevation of seed source, feet	Planting elevation		
	960 ft.	2,730 ft.	5,650 ft.
PONDEROSA PINE			
6,505	63	61	62
6,322[1]	64	64	64
6,250[1]	64	64	62
5,765	63	64	62
5,555	63	63	64
4,527	64	64	64
4,473[1]	64	63	64
3,495	64	63	58
2,748[1]	62	61	63
2,719	64	63	53
2,283	63	64	61
1,402	64	64	63
783[1]	64	64	59
783[1]	64	64	58
618	64	64	58
345	64	63	57
JEFFREY PINE			
7,861	64	63	62
6,635	62	64	64
3,450	64	64	45

[1]Single tree progeny.

Considerable site variation within each plantation also was detected.

Stem taper changed with elevation of planting and elevation of seed source. Progenies of highest sources were stockiest at all plantations, but all progenies were stockier at the highest plantation.

The number of branches and the number of years that needles were retained both were greatest at the 5,650-foot plantation. For ponderosa pine, neither character varied significantly with elevation of seed source. For Jeffrey pine, elevation of source did not affect needle retention but did affect branch number. Trees from the lowest source had fewer branches.

The degree of lean and breakage of stems was greatest at the 5,650-foot plantation. In this plantation low-elevation sources of both species suffered the most lean and the greatest amount of stem breakage.

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University of Rangoon Needs American Forestry Books

The Department of Forestry at the University of Rangoon, Burma, is trying to build up a library of forestry and related subjects.

According to the Burma-American Institute, technical books are difficult to obtain in Burma because of the expense and the problem of monetary exchange. Gifts are exempt from such troublesome restrictions.

It is said that American forestry periodicals and books are practically nonexistent in Burma.

American foresters wishing to donate books or journals may send them direct to the Faculty of Forestry, University of Rangoon, Prome Road, Rangoon, Burma. They should be labeled as gifts.

Books should not be sent to the Society of American Foresters for forwarding. The Society cannot undertake to act as an agent.

The Future for Wood-Using Industry in New York State[1]

William A. Duerr

THE QUESTION of New York's wood-industry future has two parts. One is the future of forest industry in general: What forces are at work in the nation, shaping the management of forest land and changing the markets and consumption of forest products? The other part of the question is the future of the New York economy: In what lines of production will its advantage lie, considering its resources and means and those of other states and of other nations?

What I am going to offer on the industry's future is pessimistic, but tinged with hope. Martin Luther stated that everything done in the world is done by hope. As foresters, we do not—and I believe we cannot and must not—suppress our biases regarding the fundamental importance of forest resources to the life of the state. We hold that the forested half of New York's land should always contribute heavily and in varied ways to her prosperity.

The National Question

Let us try to visualize the long-term graph of industrial timber cutting in the United States. This graph shows, first of all, one prominent hill with a summit located about 1907. Then there is a fairly narrow and deep valley, whose low point is in 1932. Beyond this is rising ground. We stand today somewhere on this rise, at an elevation just about equal to the previous summit. Is this another great hill that we are on, with a descending slope on the far side of it? Or are we climbing to a plateau? And in any case, where is the top of it: how far ahead and how far up?

All the recent nationwide forecasts of the timber future have projected long-continuing, steep increases in the demand for wood. Some have predicted as much as a 120-percent increase between now and the year 2000. These, however, are forecasts of demand, not of timber output or wood-industry activity. The outlook for the latter is less spectacular. Even the Forest Service's latest study, the "Timber Resource Review," which emphasizes as likeliest an 80-percent rise in demand by 2000, strongly suggests that the nation cannot succeed in meeting any such demand without depleting its resources.

Furthermore, even the projected demand itself is as high as it is mainly because we anticipate a soaring population. Per capita demand is not expected to rise. Nor is the relative demand for wood in proportion to all materials. The picture is not of our entering an era of wood. As a matter of fact, we seem to be putting such an era behind us. Some people believe that what we are entering, so far as forests go, is a nontimber era, in which the recreational, wildlife, and watershed values of forest land will get an ever bigger share of attention. Some speak of a cellulose era, perhaps not based upon timber laboriously grown and tended, but based on artificial photosynthesis. The suggestion seems less preposterous than it did only a decade or two ago.

To speak of cellulose in contrast to wood in its natural form is to raise the question of contrasting trends in the different branches of the wood-using industry. On the one hand, the lumber industry in the United States reached its peak in both total and per capita output around the turn of this century. Since then the industry, taken as a whole, has generally lost ground. Its per capita production is down to about half of the peak level. Man-hour productivity in the industry has moved ahead little if any over the decades; the price of the product has risen rather steadily at a rate close to 2 percent per year faster than the general price level; consumers widely have transferred their preferences from lumber to its substitutes. Nothing short of heroic efforts in technology, product improvement, and advertising seems likely to save the industry's dwindling markets.

Indeed, the only major industry processing wood in more or less its natural form, that has not gone the way of lumber, is softwood plywood.

However, the prime contrast to lumber and its allied products is furnished by the other great branch of wood-using industry, pulp and paper. General output trends in the United States, both total and per capita, have been steeply upward throughout the life of this industry. Man-hour productivity has risen; relative prices have been held down while the product has been elaborated and improved; and the industry has been comparatively aggressive in its research, product development, and advertising. The future of this industry in the United States, though not unclouded by threats of substitution, is generally seen to be bright—indeed, brilliant by comparison with lumber and allied products. Pulp and paper is nearly unique among major forest industries in exhibiting a growth

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[1] Adapted from a paper given at an annual meeting of the New York Section, Society of American Foresters.

rate higher than that of the United States economy at large.

The New York Question

To turn, now, from the national scene to our own State of New York, let us first think for a moment about the general economy of the state, the immediate setting within which the future of our wood-using plants will be determined.

New York is one of the older, more mature industrial areas of the country. It is by no means the extreme example of such an area. This distinction falls to parts of New England, which for years has worried about its maturity and has analyzed itself apprehensively. The New England analysis is instructive to us in New York to the extent that we share in its problems or may do so in future. What are some of the characteristics of a mature industrial area—in contrast, let us say, with our great competitors, the South and the West Coast, which are industrially immature?

For one thing, the mature area exhibits a slower than average rate of economic growth. It has less room and less opportunity for expansion.

Second, the mature area encompasses some heavy populations. Thus it has the advantage of nearness to great markets. At the same time, it is confronted with countervailing disadvantages in many of its other characteristics.

Third, the mature area has depleted much of its original base of natural resources. Primary production—from forests, mines, and farms—makes only a small contribution to economic life. Secondary production—the bulk of manufacturing—is more and more restricted to those lines which can thrive at locations close to consumers despite the need to import raw materials from a distance, and to those lines which can gain special advantage from the use of local labor skills. There is growing emphasis upon tertiary production—trades and services. However, the position of the trades and services is precarious since they must rest largely upon local primary and secondary activity.

A fourth characteristic of the mature economy is high labor cost—not necessarily high wage rates, but high costs resulting from such things as lagging technology in outmoded plants, highly developed labor unionism, and greatly elaborated benefit programs for labor, such as compensation and unemployment insurance programs.

A fifth characteristic of mature areas is their relatively great emphasis upon the social interest, but not necessarily upon the business interest. Public regulation and public services are highly developed, and consequently the cost of government is high. At the same time, the area is apt to be a net exporter of federal tax receipts. The upshot is heavy state and local taxes.

Finally, let me mention a sixth characteristic of the mature economy. This is a spirit of conservatism and an inordinately keen awareness of risk among business and industrial circles, in the banking fraternity, and in government. Within these groups also one may find a highly developed ethical sense that militates against the use of rough and rowdy competitive tactics such as may readily gain acceptance in immature areas.

Now the economy of New York State does not fully qualify as mature in respect to all the matters I have mentioned. However, as we work through the list, we can find items that carry a sense of familiarity and truth to us as New Yorkers. Clearly, our situation in some respects is not peculiar, but characteristic. In this characteristic situation, the history of our wood-using industry has run true to form. Let us remind ourselves of the chief facts in this history. Then let us ask if the future, too, will be characteristic.

Pulp and Paper

The pulp industry reached its peak output in New York in 1905, with a production of close to a million tons, nearly half of the national total. The industry is by nature oriented to its raw materials, and in New York was traditionally spruce-oriented. Output has declined with the state's softwood-pulpwood resource and with the growing difficulty of wood-importing operations, which for many years have featured the industry's fight for existence. New York's pulp output now has fallen to about 60 percent of its peak and 3 percent of the national total. Even so, the industry is confronted with an adverse ratio of growth to cut of its New York softwoods, and is importing, at high cost, some three-fourths of its wood.

Our pulpmills, now fewer than 40, have an average capacity of about 60 tons per day, less than 40 percent of the national average. Their location, once strategic for using local softwoods, is a disadvantage in their importing operations. Their equipment for the most part is old. Only the fact that it has been depreciated lends its owners a point of competitive advantage.

The future of softwood pulping in New York is generally conceded to be unpromising. Hardwood pulping, however, is another matter. In the mill, the technological problems are being solved. In the forest, the growth of small hardwoods is thirteen times the cut.

Paper and paperboard manufacture, which is better able than pulping to thrive near market and away from raw materials, has shown a very slowly rising trend in New York over the decades, and in recent years has held approximately steady. Relatively, however, the industry has fallen off: from a fifth of the national output 40 years ago to a fifteenth today. Our paper mills are commonly unintegrated. Much of their raw material is local wastes or imported pulp. Indeed, possibly nine-tenths of the wood represented in their consumption originates out of state. Generally old and inherently high-cost operations, they cling to the advantages arising from location near market, from the fact that their depreciation process is completed, from local labor skills, and from emphasis on qualities of paper in which speed and tonnage are not essential and in which the raw material makes up a small fraction of total cost.

Although the future of the paper

industry in New York is not seen to be particularly bright, the industry is of great significance to us because, even though it should decline somewhat in absolute volume over the years, it would still represent a tremendous potential market for New York timber. Here the key to the future appears to rest with the hardwood sector of our pulp industry.

Lumber and Allied Products

So much for pulp and paper. Now how about lumber? If New York has fared poorly in the nationally growing industries that are among the least exacting in their raw material requirements, we may well expect her to have cut a poor figure in the lumber industry, a declining industry with more stringent material requirements. In fact, New York lumber production has dropped off by more than two-thirds since its high point over a hundred years ago. Its position in the national output has declined even more sharply: from 20 percent in the peak year to 1½ percent now, and this has happened while the state industry was shifting over from largely softwood production to largely hardwood. In recent decades, there have been some increases in output. Numbers of mills, too, have increased, so that the average mill has stayed small or even grown smaller. At the same time, the sawmill's manufacturing process has undergone little or no change. Thus our predominantly hardwood lumber industry has not shared in the technological comeback, slight as it is, that the softwood lumber industry has managed to make in some sections of the country.

Although technological backwardness is admittedly a problem, the future has some brighter aspects, too. One of these is our increasing inventory of hardwood standing timber in New York, mainly in the smaller sizes, but already reaching into the sawtimber category as well. Another is New York's huge manufacturing industry, many segments of which use hardwood lumber as raw material, much of it imported.

In assessing our timber future, we can find a number of parallels between our lumber remanufacturing industry and our paper industry. The remanufacturing industry, which turns out furinture, millwork, containers, toys, novelties, and a host of other products, has shown some tendency to expand in the last couple of decades. It is an industry adaptable to location near market but away from raw material. The industry in New York imports three-fourths of the wood it uses. A great share of the importation is western and southern softwood. However, of the 15 species that made up the bulk of the industry's requirements in 1954, 9 were species grown in New York State, and of these, in turn, the use of 7 was increasing.

Supported by research in technology and by product and market development, New York's wood-remanufacturing industry may well hold its own in at least the near future. Doing so, it will continue to offer new and larger outlets for our lumber industry, provided the channels of production and marketing can be opened up.

Multiple Forest Uses

Although my concern here is with the wood-using industries, I must at least refer to the forest industry that is based on other than wood values. There is, for example, the strong prospect of growth in New York's recreation industry and in the values of its forest wildlife and watersheds. New York foresters can ride this wave of the future, identify themselves and their profession less exclusively with timber, and work for practical and acceptable methods of multiple use.

Of course, it is not only the timber beasts who can benefit from broader thinking: the nontimber forest interests, too, can well give more consideration to the potentialities of multiple use.

Then there are two of the so-called minor products that have reasonably good-looking growth curves and much future promise in New York. These are Christmas trees and maple products.

In briefest summary, then, while New York's nontimber forest industry shows some aggressive growth and bright prospects, our wood-using industry is relatively stagnant. Its problems are in part national problems, in part those of our maturing state economy. Nevertheless, many of the problems are opportunities in disguise. What may be done to help take advantage of the opportunities?

Measures in Support of Industry

1. Pursue strongly our central professional objectives of rebuilding New York's forest resources. Surely, with its secondary industries showing the greatest promise, and considering that these are heavy importers of raw material, New York has at least a toehold on the basic essential—that is, the market—for timber management. Management effort may well be directed not only toward the natural forest, but also toward developing fast-growing strains of hardwood for pulpwood plantations.

2. Make the most of the resource surpluses now at hand, notably the hardwoods of less than sawtimber size and the thinnings to be had from New York's many, crowded softwood plantations.

3. Encourage the state's wood-using industry to organize more effectively to hold its ground. There is need both to work for a better economic environment within the state, especially a greater public appreciation for the industry, and to work on product and market development.

4. For the predominantly small-scale lumber industry of New York, which is not in position to take concerted action, make studies under public auspices of the industry's structure: its costs and competitive position, its technology, and its marketing methods. Make similar studies within the main small-scale branches of lumber remanufacturing.

5. Bring up to date our information on the New York pulp and paper industry: its trends, problems, and needs.

6. Finish research now in progress on forest property taxation in New York, giving special emphasis to the effects of the tax upon re-

source use and industrial development. Present the findings clearly and publish them widely so that at least our tax adminstration may be improved.

7. Finally, I would mention, partly by way of reemphasizing the foregoing points, the need for greater knowledge. One of our pervading problems is the over-acute consciousness of risk, typical of maturing areas. Risk can be lessened through knowledge: of the potentialities of forestry, about which we have so much to learn; and of the potentialities of forest industry, whereon much of our hope for forestry rests.

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Shoestring Fungus and Planted Larch on Cutover Land

David B. Cook

IN THE NORTHEAST, millions of acres that formerly bore coniferous or mixed forests have been reduced to hardwood weeds or trees of poor form and quality by clearing, overcutting and fire, followed by abandonment. There are sound reasons why such woodlands should be converted to economically more profitable types, chiefly by clearcutting and planting to conifers (*4*). Yet, to attempt to convert stands in which oak (*Quercus*) is present, even in small quantities, poses a hazard from attack by the shoestring fungus (*Armillaria mellea* Vahl ex Fr.). This Basidiomycete, also known as the honey fungus, is of worldwide distribution and is present in most forest soils. Usually, it is either a saprophyte or a weak parasite but, under certain favorable circumstances, it may become strongly parasitic and attack a wide variety of trees and shrubs. Its importance as a woodland problem has long been recognized but its ecological relationships in the forest have not yet been satisfactorily worked out and a good deal of guessing has been done to explain the sudden, violent outbreaks of parasitism (*7*) and their sometimes equally sudden abatement, even in the presence of a continuing and abundant population of the fungus.

In older conifers, shoestring fungus causes a root rot which may ultimately work its way into the butt; "death of the tree, if it ever results, may take a very long time" (*1*). On small conifers, spectacular symptoms are caused by attack at or near the main stem. "Death of trees girdled at or above the root collar usually ensued rather suddenly, before the fungus had spread into the root system and before any secondary symptoms, such as foliage yellowing or growth reduction, could appear" (*6*). A tree may appear perfectly healthy one year and die in the middle of the next growing season. Generally, it has been thought that once such a tree was infected, it was doomed.

Spaulding (*8*) was of the opinion that "commonly the fungus seems to require some injury to the bark which exposes the wood of the roots in order to attack otherwise healthy trees" . . . but that . . . "the moment a tree declines so that some of its roots die, the fungus is quick to attack . . ." However, Patton and Riker (*6*) have recently demonstrated that *Armillaria* can successfully attack uninjured white and red pine and that this fungus "attacked and killed apparently healthy, vigorously growing trees in 7—10-year-old coniferous plantations in Wisconsin, with no indications that other agencies weakened or predisposed the trees to infection" (*6*).

In Great Britain (*1*) "the occurrence of widespread infection is almost always associated with the presence of abundant infection centers, usually in the form of infected stumps" and "there is a strong suggestion that successful attack is aided by conditions that adversely affect the general well-being of the tree." Spaulding (*8*) cautions that "forest plantations . . . should not be planted on land which has recently been cleared of oak, since dead oak roots are especially liable to harbor this fungus." This admonition is well taken for, in much of the Northeast, cutover land will have at least some oak on it. Attack by shoestring fungus must, therefore, be reckoned among the calculated risks of conversion. But just how great is this risk, for either the short term or the long pull?

Cooxrox Forest is typical of the cooler portions of the Northeast. It it situated on the Rensselaer Grit Plateau in east-central New York, at 1,400 feet elevation. The original forest was northern hardwoods—beech, maple and hemlock. During a century of agricultural occupation, some of the land was cleared and cultivated, some was cleared for pasture but never plowed, while a considerable portion was cutover repeatedly but never cleared. The warming and drying effect of wholesale deforestation, followed by agricultural abandonment, brought in a whole new forest complex dominated by gray birch and aspen, with a scattering of black cherry, white ash, and red oak. Even though the oak is here very close to the upper al-

THE AUTHOR owns and operates Cooxrox Forest, Albany, N. Y.

titudinal limit on the Plateau, its growth is rapid and its reproduction abundant and vigorous. The presence of *Armillaria* in all the wooded areas is attested by the "shoestrings" to be found in the forest floor, the rings of toadstools that come up around infected stumps in September, and by the occasional wild tree that has been killed by it.

Because the timber on lots that have reverted to pioneer hardwoods has little present value and even less potential worth, and because conifers grow exceptionally well on these fertile, well-drained and well-watered sites, conversion to softwoods by clearcutting and planting is economically desirable. And because of its rapid and vigorous juvenile growth, much of our conversion has been done with larch, using Japanese larch (*Larix leptolepis*), European larch (*L. decidua*), and the Dunkeld hybrid larch (*L. eurolepis*). British foresters consider Japanese larch to be "outstandingly susceptible" to shoestring fungus while European larch is rated as "resistant" (*1*). Physiologically, hybrid larch tends to resemble its Japanese parent. The use of Japanese or hybrid larch would seem, therefore, to be exceptionally risky. However, what has actually happened on one small but closely observed area is illustrated by several case histories:

Plantation No. 25. — Hybrid larch. Our first recognized outbreak of shoestring fungus occurred on an area which had reverted from pasture. A stand of mixed hardwoods with a scattering of hemlock and pine was clearcut in 1938, the brush windrowed. The next April, 2-0 seedlings were planted and, during the summer, all hardwood seedlings and sprouts were slashed down to release the conifers. These operations provided an abundance of newly-dead and moribund stumps and a heavy cover of slash which kept much of the surface shaded, moist and warm. Four seasons after planting, a group of larch—now grown to sapling size—showed symptoms of shoestring fungus. The infection was traced to a nearby red oak stump. These larches died but there was no observed recurrence, either nearby or elsewhere in the plantation. In one spot, three larches, including one unthrifty tree, have stood within six feet of a soft maple stump that annually produces a ring of shoestring fungus toadstools without having become infected. Careful examination in September 1955 revealed shoestring sporophores over the whole area.

Plantation No. 28.—European larch. A two-acre hilltop, reverted to gray birch and aspen with an abundance of small red oak in the understory, was clearcut in 1940. In the spring of 1941 the slash was burned broadcast and the area planted to larch seedlings. Despite an abundance of oak seedlings and saplings, only one focus of infection developed and that from a group of old oak stumps resulting from an earlier cutting. By 1950, three larches had become infected; two were dead and the third flowering heavily, a circumstance that often presages death. The sick tree was marked for later examination. This plantation was thinned and pruned early in 1954. One of the trees deemed good enough to prune still bore a faded marker; in four seasons it had satisfactorily recovered from a major shoestring fungus infection.

In conjunction with the thinning of 1950, several hundred seedling sprouts of red oak were lopped off. Even though many of the stubs sprouted, the cutting must have resulted in a great reduction of vigor and the death of many root systems. Yet, no new outbreak of shoestring fungus has resulted.

Plantation No. 30.—Japanese larch. The southeast slope of the hill that is in part crowned by No. 28 was clearcut in 1941, the brush burned in piles. It was planted with unusually large 2-0 Japanese larch in the spring of 1942. By 1947 there were two major foci of infection and several single-tree cases. Losses were worse in 1948, when one of the foci seemed to be spreading rapidly, as is often the case in coniferous stands. Trees up to 3 inches in basal diameter and 12 feet tall were being killed, others had a main root killed almost to the root crown. When the plantation was examined in 1950, in its ninth growing season, there was no evidence of new infection. Some trees had died, some that had lost only one or two roots put out new ones, and the trouble abated. During the great wind of 1950, this steep slope was hit by repeated gusts that uprooted or sprung perhaps ten percent of the planted trees. Despite an abundance of broken larch roots available, shoestring fungus did not again become epidemic.

There can be no doubt that shoestring fungus can and sometimes does attack larch planted on cutover land, or that the larches react strongly and often successfully to the attack, frequently making satisfactory recovery. Before the potentialities of this pathogen at Cooxrox Forest were fully appreciated, two more conversions had been completed:

Plantation No. 31.—Japanese larch. This two-acre terrace top was clearcut in 1942, removing a fair cut of gray birch and soft maple but reserving 28 red oak dominants ranging from 9 to 13 inches d.b.h. Because of their large crowns, acorn production had been heavy and oak reproduction was abundant. The next spring the area was planted with Japanese larch. The choice of species was in error, for this site proved to be too dry. Losses began to show up in 1945. The situation has been obscured by the effects of drought, competition, and the work of several ant colonies but it is certain that many larches did succumb to shoestring fungus. Cumulative losses were so heavy that, in 1948, four hundred red pines were planted to replace the fails. Wherever a larch had died, a pine was planted as close as practical to the dead tree. However, since then, there have been no identifiable losses to shoestring fungus either among the larches or the pines.

Plantation No. 32.—Japanese larch. A two-acre basin was clearcut of a stand predominantly of aspen, then planted to larch in the spring of 1947. The soil here is very rocky but fertile and well watered. There is almost no oak, either in the overwood or the understory. No planted larch has been lost to shoestring fungus.

On the basis of experience with

these five plantations, and in view of the opinion of British foresters, there was at least a suspicion that Japanese larch was more susceptible to shoestring fungus than was European larch. In an attempt to provide a direct test, Plantations No. 34 and No. 35 were made in 1950, using alternate rows of these two species. In both cases, the previous stand had been gray birch and aspen, with only a little oak in the understory. These two attempts proved nothing—neither species showed any loss attributable to this fungus, even though the European larch was of an unsuitable race and very low in vigor. Subsequent conversions using hybrid larch (*5*) have been made on sites comparable to No. 32 with no mortality from showstring.

It is well known that *Armillaria* is widely present on the Grit Plateau, for sporophores are abundant in the woods in late summer and early autumn. Outbreaks of vigorous parasitism have been detected from the secondary symptoms—sudden reduction in growth and yellowing of the foliage—which are very conspicuous in young larch. In all cases, these attacks have been confirmed by excavation to detect mycelial fans under the bark at the root collar, the associated copious flow of resin, and the presence of "shoestrings" in the duff. The outbreaks at Cooxrox Forest have all been checked by one or more of the following pathologists: Donald S. Welch, the late Perley Spaulding, J. R. Hansbrough, Glenn G. Hahn, E. W. Littlefield, W. E. Smith, and J. A. Lowe.

Bliss (*3*) suggests that the shoestring fungus must become established on a durable substrate with adequate food reserves in order to produce the rhyzomorphs which cause the infection in conifers. He also determined (*2*) that the largest development of rhyzomorphs, both in number and in length, occurred at the lowest temperatures in a series from 45° to 100° F. These findings may well explain why successful attack on conifers—or, at least, on larch— does not take place until some time after the trees have been planted and the regrowth of the forest has begun to protect the site. In the first four cases cited, trouble was not evident until the fourth, tenth, sixth, and second season after the trees had been set out.

Conclusions

After more than twenty years of observation at Cooxrox Forest, it is evident that the presence of oak stumps, especially old stumps from trees of considerable size, poses a definite hazard to larch planted on areas newly clearcut from weed hardwoods. Apparently, small oak stumps are not so great a problem. Brush disposal or lack of it makes no difference. There is still no more than a suspicion that, under our conditions, Japanese larch is significantly more susceptible than European or hybrid larch. Red pine seems to be resistant. Trouble is more apt to occur on dry sites than on moist ones, perhaps because there is little oak on the latter. After a decade the chance of reactivating strongly parasitic shoestring fungus by silvicultural operations is greatly reduced, even though new supplies of dead oak roots become available. Even when attacked, planted larches do not necessarily die; many recover and grow well thereafter.

At Cooxrox Forest—and presumably in comparable areas throughout the Northeast — the shoestring fungus is a real and sometimes startling but not a grave threat to larch planted on newly cutover land on which oak has been growing. The hazard is not great enough to be a real deterrent to the conversion of weed hardwoods by clearcutting and planting to larch.

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Notes & Observations

13th Congress International Union of Forest Research Organizations (IUFRO)

During the period September 10 to September 16, 392 foresters from 41 countries met in Vienna, Austria, to participate in the 13th Congress of the Union. Dr. James MacDonald of the United Kingdom, president of the Union, opened the Congress in an official ceremony, after which the members broke up into 10 working sections where specific topics were dealt with. In Section 01 on Bibliography and Terminology, special emphasis was placed on developing an acceptable forest terminology for worldwide use. In addition, attention was given to establishing a decimal classification of forestry literature; this is being done in cooperation with experts of FAO. The section on General Forest Influences (11) had selected three general topics for discussion: (1) The role of forests and engineering structures in the control of floods and erosion; (2) the management of forested watersheds for water supply; and (3) the structure of shelterbelts.

During the meetings of the section on Site Research (21), reports were presented on (1) site and vegetation research as a guide in the treatment and management of forests; (2) the change of the site, with special emphasis on soil characteristics, as a result of planting tree-species nonadapted to a site, and (3) the biotic factors of natural regeneration in the forest, including the effects of mycorrhiza and root excretions.

In Section 22 on the Study of Forest Plants, reports on the production of seed by forest trees, and on the pines in the tropics and subtropics were presented.

Members of Section 23 on Silviculture heard some 7 topics discussed, dealing with the classification of stand structures, the effects of forestry measures on the quality of the stand, various aspects of forest nursery management, as well as problems of tropical forestry.

In Section 24 on Forest Protection, 4 main problems were discussed: (1) the dynamics of insect populations; (2) research on mycorrhiza; (3) methods and possibilities of international cooperation in the study of forest tree pathology; and (4) damages caused by industrial smoke.

In Section 25 on Study of Growth and Yield and of Forest Management, various problems were considered, such as the place of biometry and electronic computers in forestry research, the use of aerial photographs in inventory work, forest increments in the tropics, and the standardization of mensuration techniques.

The section on Forest Economics (31) was concerned with accounting systems and investment methods in forestry, the relative productivity of forest workers, and matters dealing with forest inventory.

Section 32 on Operational Efficiency had four main topics under consideration. (1) the scope and place of courses in operational efficiency in a professional university curriculum; (2) the influence of mechanization on silviculture; (3) the efficiency of forest workers; and (4) the effect of noise and vibration on the forest worker.

In Section 41 on Mechanical Conversion, papers were presented and discussed on the importance of compression wood and tension wood on timber quality, methods of wood identification, and nondestructive methods of testing standing timber.

In addition to the general topics mentioned for each of the 10 sections, additional special projects for future attention were discussed, e.g., progeny testing, pollen bank, and correct terminology. All of the papers that were presented, as well as the discussions after each paper, will be printed in the proceedings of the Congress.

Throughout the Congress there were special meetings of the International Council and the Permanent Committee to discuss the internal operations of the Union. It was decided to add one more section, namely, that of History of Forestry. The International Council approved the revised text of the International Code of Nomenclature for Cultivated Plants that had been issued recently by the International Union of Biological Sciences.

It was decided to hold the next Congress in Germany, during the period of 1964-1966, and the new officers of the Union that were elected are Professor J. Speer, Germany, as president, and Dr. V. L. Harper, U.S.A., as vice president.

After the closing ceremony on September 16, the participants had an opportunity to take part in extended field trips lasting until September 29. There were three trips covering the following interests: (1) silviculture and related disciplines; (2) forest protection; and (3) techniques in forest management. The trips covered all of Austria, and the itineraries were chosen so that the participants had an opportunity to become acquainted with the forestry problems in Austria, and the routes led through the most scenic parts of Austria.

Throughout the meeting in Vienna, there were opportunities to visit research stations near Vienna. One of these trips was to the Federal Forestry Research Station at Mariabrunn, where the International Union of Forest Research Organizations was founded in 1893. The visitors were given photocopies of the signatures of the Charter Members.

The Congress was most profitable in establishing new contacts between fellow research workers, exchanging results on research work, and above all facilitating research cooperation on an international basis. Thanks to a grant by the National Science Foundation to the Society of American Foresters, not only representatives from the U. S. Forest Service, but foresters from universities and other research organizations were able to participate. There was a total of 30 foresters from the U.S.A. and all profited greatly by this Congress.

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Strong Hydrogen Peroxide for Sterilizing Coats of Tree Seed and Stimulating Germination

In studies requiring aseptic conifer seeds, we have found highly concentrated hydrogen peroxide (H_2O_2) to effectively sterilize seedcoats without injuring the seed. In addition, such treatment offers a bonus of stimulated seed germination.

Initial use of concentrated H_2O_2 proved so successful that no further study was necessary for our purposes. Results are offered in this preliminary form so that researchers who need fast germinating, aseptic seed will be aware of the utility of this technique. We hope also that our results will encourage other researchers who are now studying effects of low concentrations of H_2O_2 on seed germination to expand their studies to include high concentrations.

Some spores have been shown to survive treatment with 5-percent H_2O_2 (*4*), so a stronger solution is needed for dependable sterilization. Assuming that the most dependable treatment would be the strongest solution that seeds could tolerate without injury, we tried 35-percent H_2O_2. A half-hour soaking of smooth-coated seeds, such as those of *Pinus, Picea, Larix, Pseudotsuga,* and *Tsuga,* provided effective surface sterilization without injury. Seeds with resinous coats or attached wings, such as those of *Abies,* required up to an hour's soaking. Although seeds smaller or with thinner seedcoats than those mentioned were not studied, it is likely that shorter treatments would be needed to avoid seed injury.

H_2O_2 has particular advantages over the compound most commonly used for seedcoat sterilization—mercuric chloride. This compound is highly toxic and must be washed away after treatment. Even after careful washing, enough mercuric chloride may remain to kill some seed (*1*). In contrast, H_2O_2 breaks down into harmless compounds, leaving no toxic residue. The seed can be transferred directly from soaking bath to agar plates for germination. In fact, the surface film of H_2O_2 kills organisms that may attach to the seed during transfer. More than 1-percent contamination of filled seed is unusual when this method is used.

Incidental to our use of strong H_2O_2 as a seedcoat sterilizer, we discovered that not only can most conifer seeds withstand over an hour's soaking without apparent injury but their germination is strongly stimulated as well.

Weak solutions of H_2O_2—1 percent or less—have been reported to increase germination rates of seed of *Abies* (*2*), *Acer* (*8*), *Cryptomeria* (*5*), *Larix* (*6*), *Pinus* (*2,5*), and *Pseudotsuga* (*2,6*). But use of weak solutions requires either extended soaking or opening of the seedcoat to be effective. When a strong solution such as 35-percent H_2O_2 is used, a relatively brief soaking stimulates germination without individual handling of seeds. For species with thin seedcoats, such as *Pseudotsuga menziesii, Picea sitchensis, Tsuga heterophylla,* and *Larix occidentalis,* we have found a half-hour soak in 35-percent H_2O_2 to be adequate. Species with thicker seedcoats, such as most pines, may require up to 2 hours' soaking before a marked stimulation of germination results.

Although we have not obtained stimulation effects quite so spectacular as Weeber's "explosive reaction" of hemp seed treated with 30-percent H_2O_2 (*7*), results have been impressive. The time required to reach germinative energy is generally less than half that for untreated seed. Even more marked results have been attained with certain seed lots which were unusually slow in breaking dormancy. For example, 12-year-old seed of *Pseudotsuga menziesii* showed germination of only 30 percent of the filled seed at the end of 60 days when untreated. Seed of the same lot, soaked a half hour in 35-percent H_2O_2, had 95-percent germination in 30 days.

Thus, treatment of conifer seeds with a strong solution of H_2O_2 offers a double-barreled shortcut for many kinds of laboratory or greenhouse studies: (1) it simplifies effective seedcoat sterilization and (2) it stimulates germination. There is no question about its value in sterilization, but considerable study is needed to determine if H_2O_2 treatment can substitute completely for stratification. Furthermore, H_2O_2 treatment induces mutations in some fungi (*3*). This would not appear to be important with tree seed because seedlings of several species from seed treated with 35-percent H_2O_2 have been raised for 8 months with no indication of abnormality. Nonetheless, the mutagenic effect of H_2O_2 on tree seed needs careful evaluation.

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1960 Christmas Tree Data[1]

To those who have followed the planting of Scotch pine for Christmas trees in recent years, it should come as no surprise that this species is high on the list of harvested Christmas trees. For 1960 it was number two in Christmas tree production in this country. A dozen years ago when 807,000 Scotch pine trees were harvested it was in sixth place and this accounted for four percent of the U. S. production. In 1955 it had climbed one notch to fifth place, but almost doubled to over a million and a half trees. The data for 1960 show Scotch pine is in second place with nearly 5½ million trees harvested.

Douglas-fir retains its lead established in 1955 and pushed to a new production high of 7⅓ million. Balsam fir continues as a high production tree—over the five million mark, but is third now in the listing. These three species now account for 56 percent of our U. S. production of Christmas trees.

Another change was the climb of Norway or red pine, which a dozen years ago was less than one percent of our production and five years ago made up four percent. For 1960 it was 10 percent with a total of over three million trees. Eastern redcedar, a widely distributed evergreen throughout the eastern and southern United States, continues in the top five, which as a group made up three-fourths of total production. Table 1 shows the listing of all species reported.

TABLE 1.—1960 U. S. PRODUCTION OF CHRISTMAS TREES

Species	Number	Percent
Douglas-fir	7,329,172	23
Scotch pine	5,434,050	17
Balsam fir	5,142,224	16
Norway or red pine	3,222,207	10
Eastern redcedar	2,472,909	8
Black spruce	1,566,260	5
White spruce	1,501,802	5
White fir	658,238	2
White pines (eastern and western)	618,205	2
Norway spruce	561,202	2
Red spruce	524,566	2
Southern pines	304,600	1
Pinyon pine	294,172	1
Virginia pine	279,923	1
Grand fir	206,970	1
Arizona cypress	157,920	1
Red fir (Shasta and California)	152,936	3
Concolor fir	142,120	
Jack pine	139,975	
Engelmann spruce	135,273	
Lodgepole pine	93,531	
Austrian pine	77,000	
Noble fir	36,705	
Alpine fir	31,377	
Fraser fir	25,000	
Ponderosa pine	20,621	
Blue spruce	19,416	
Silver fir	8,825	
Sitka spruce	5,040	
Other	199,273	
Total	31,361,512	100

Of the total 1960 U. S. production of 31⅓ million Christmas trees, the Lake States region led in 1960 as it did in 1955 (Table 2). This can be explained by the numerous plantings a few years back of Scotch pine and Norway or red pine for Christmas trees. The Pacific Coast and Northwest States (five all told and including Montana) have maintained their second place spot, and reached a new high of over 8¼ million in 1960. The bulk of these trees were Douglas-fir. The only region to show a decrease from 1955 was the Southern—made up of 14 states—and the decrease was negligible.

Montana's[2] Christmas tree production records date back to 1942 and for 14 of the intervening years its production was over the three million tree mark with one year—1956—over the four million mark. Last year its 3,200,000 Christmas trees were shipped to 25 states, including Hawaii, and a few carloads were exported to Bolivia. A few other states, among them Oregon, Washington, and Pennsylvania, are now beginning to report annual production.

Imports Above Ten Million

United States imports of Christmas trees are shown in Table 3 and the 1960 figure shows a total of 10,688,576. U. S. domestic production plus imports bring the total number distributed over the United States in 1960 to over 42 million Christmas trees and include about three dozen species.

[1]The 1960 Christmas tree data were compiled by Miss Theresa G. Hoerner, analytical statistician, U. S. Forest Service. These data supplement the 1955 data contained in AIB 94, "Christmas Trees—The Tradition and The Trade." This survey was made with the cooperation of the U. S. Forest Service, various industries, extension and state foresters, and others. (Note: AIB 94 may be obtained from the Government Printing Office, Washington, D. C., at 15c per copy.)

[2]Research Note No. 82. Intermountain Forest and Range Expt. Sta., Forest Service, U. S. Dept. Agric., Ogden, Utah. April 1961.

TABLE 2.—PRODUCTION OF CHRISTMAS TREES IN 1960 BY REGIONS

Region	Number
Northeast and Middle Atlantic States (11 States)	6,547,120
Lake States (3)	10,650,000
Central States (5)	1,520,000
Southern States (14)	3,474,000
Prairie States (4)	45,500
Southern Rocky Mountain States (6)	793,892
Pacific Coast and Northwest States (5)	8,275,000
Alaska	56,000
Hawaii	none reported
Total	31,361,512

Ownership of Christmas Tree Land

Most of the Christmas trees continue to come from privately owned lands. In 1955 the figure was 81 percent; in 1960 it was 89 percent. As between private farm and private nonfarm, 52 percent came from farm and 37 from nonfarm land in 1960. Public lands produced the remaining 11 percent compared to 19 percent in 1955. Of the trees from public lands, seven percent were harvested from state and county lands. Less than a million trees are taken annually from the 180 million acres of national forests (Table 4).

Christmas Tree Plantations

Nearly three-fourths of our Christmas trees came from wild or natural stands in 1960 compared with 87 percent five years ago. Farm and nonfarm plantations accounted for the other one-fourth, or eight million trees as against 3⅓ million in 1955.

It is estimated that there are now over 625,000 acres of privately owned land devoted to the growing of Christmas trees. Michigan reports over 10,000 Christmas tree growers while Pennsylvania has over 2,000. There are now 21 Christmas Tree Growers' Associations involving 23 states. Also 31 states have issued a total of 71 publications dealing with the production, management, marketing, and consumer preference of Christmas trees.

TABLE 3.—UNITED STATES IMPORTS OF CHRISTMAS TREES[1]

Year	Number	Value	Value average per tree at U.S. point of entry
1955	12,409,578	$5,658,993	$0.46
1956	12,540,690	6,057,983	.48
1957	12,033,349[2]	6,254,547	.52
1958	9,390,867[3]	5,306,418	.57
1959	11,866,731[4]	7,003,931	.59
1960	10,688,576[4]	6,413,031	.60

[1]From Forest Products Division, Department of Commerce. [2]700 from United Kingdom. [3]1,600 from United Kingdom. [4]All from Canada.

TABLE 4.—NUMBER OF TREES HARVESTED FROM NATIONAL FORESTS

Fiscal year	Number	Value	Value per tree on stump
1955	959,651	$207,877	$0.22
1956	859,415	214,119	.25
1957	941,152	260,257	.28
1958	864,181	258,402	.30
1959	928,767	278,697	.30
1960	913,345	357,835	.39
1961	917,049	383,889	.42

Transportation of Christmas Trees

The auto truck figures conspicuously in the movement of trees to the Christmas tree markets. In 1960 over 70 percent of the trees were shipped over the highways; the balance going by rail except small numbers by air.

A Many Million Dollar Industry

The 1960 data showed quite an increase over 1955 in the value of the Christmas trees produced. The stumpage value is placed at nearly $20 million, wholesale at $36 million, and retail at $85 million. Much of this increase is probably reflected in the higher-quality plantation grown Scotch pine and Norway or red pine, which command a better price than wild grown trees.

By-Products of Coming Importance

The use of evergreen boughs for Christmas decorations — wreaths, door sprays, roping, yule logs, etc. —appears to be a source of added revenue to Christmas tree growers and was reported in 1960 for the first time. Such greenery was harvested in about half the states to total 11½ million pounds with a value of about $416,000.

Note: The 1955 Christmas Tree Data were published in the JOURNAL, December 1956 (Vol. 54, No. 12, pages 843-844).

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Points of View

Who Wants Tree Seed Certification and Why?

Seed certification, a well-established activity in agriculture, is new and untried in forestry. In agriculture, there are numerous genetically improved plants on the market, the seed of which requires positive certification as to superiority. The certification of natural seed in agriculture, once large, is no longer an important activity.

The case is quite different in forestry. No artificially improved forest tree seed is on the market today. Within the foreseeable future, all artificially improved forest tree seed will be custom-grown and is not likely to appear on the market. In sharp contrast, the natural forest tree seed business runs into the millions of dollars annually. The origin or exact source of natural tree seed is an important consideration in assuring the most productive forest because strains have developed through natural selection that are adapted to local conditions. This factor is particularly critical in the West where major tree species range over wide variations in latitude, elevation, and precipitation. Thus the identity of the seed as to origin is essential to forestry in the West and perhaps to a lesser extent other regions.

Thus the needs for certification of seed in forestry are quite different from those in agriculture. Unlike the situation in agriculture, the only certification needed today in forestry is assurance of the source of natural seed. There is no doubt that in the long run forestry will require certification of artificially improved seed.

What Is the Problem?

With these facts in mind, the present problem concerning forest seed involves two major factors:

1. There is no tested method of assuring the origin of natural forest seed, through certification, anywhere in the United States.

2. Attempts are now being made to establish a national plan for handling forest seed through federal legislation as described below. Such legislation, coupled with national rules for seed certification, is apt to prevent the natural development and testing of workable procedures suited to the varying needs of each region.

Prior to 1950 there were no serious attempts to develop procedures for certification of forest seed in the United States. In the last decade sporadic attempts have been made, but technical problems have prevented the achievement of workable methods. Currently efforts are under way in several regions to develop methods which will meet particular regional conditions and needs. This is the natural process of development which would be halted by federal legislation now contemplated.

To date this federal legislation is being promoted primarily by groups outside the field of forestry. The proposed pattern of forest seed handling would be administered at the highest levels by nonforesters. The only professional forestry organization in the United States, the Society of American Foresters, has to date established no official position with respect to forest seed handling, including certification. Nor has the Society participated officially to date in development of national programs regarding forest seed. Throughout the United States, the buyers and sellers of forest seed have expressed no desire for such legislation. The buyers and sellers of seed in the West are strongly opposed to this legislation.

What Federal Legislation Is Being Proposed?

The American Association of Seed Control Officials (an organization of state and federal seed law enforcement officers) prepared the following proposal for approval at their annual meeting on September 10-14, 1961:

"... It is suggested that the Federal Seed Act be amended to accomplish the following:

"1. Prohibit the shipment of flower or *tree* and shrub seeds to any state unless the seeds so shipped conform to the requirements of the seed law and rules and regulations pertaining to such seeds in the state into which the seeds are shipped.

"2. Prohibit importation into the United States of any flower or *tree* and shrub seeds which fail to meet minimum standards of purity and germination to be established by the Secretary of Agriculture."

What National Seed Certification Rules Have Been Proposed?

The International Crop Improvement Association, an agricultural organization of seed certifying agencies in each state, has passed a set of minimum standards for certification of forest tree seed.

Even aside from policy considerations, these minimum standards would take years of development before they would become useful to the forestry profession. In addition, they are technically unusable for Western conditions.

But the most important questions here are *not technical, but in the field of policy*. Where should forest seed certification programs originate? In nonforestry groups? At the national level? Or should they develop naturally from forestry needs and at the field level?

How Will These Proposals Affect Forest Seed?

If forest seed is blanketed under the Federal Seed act, certain patterns will have been set with the permanence of federal law.

1. Seed certification would be administered *state-by-state*, most probably under existing agricultural certification agencies. In most states it would require a major change in concept to provide for separate forestry rather than agricultural organizations to administer the certification. There are no

regionwide organizations recognized in the Federal Seed Law (see language of proposal I quoted above). This would preclude for seed certification the usual practice in forestry of confronting professional problems at the regional level.

2. Through a simple route present nationwide certification rules of the International Crop Improvement Association would have a legal status in forestry. They have none now. A federal law would encourage states to blanket forest seed under their agricultural laws. Member organizations of the International Crop Improvement Association are already the officially recognized certifying agencies as defined in the Federal Seed Law. Hence the only way forest seed could be certified is through one of these officially-recognized organizations using I.C.I.A. rules. The opportunity for changes of the rules would be reduced by the preponderance of representation by agricultural interests on all boards and committees.

3. On the state level, administration would likely be through existing agricultural boards on which forestry representation would be a minority.

What Is the Present Position of Western Foresters?

The Puget Sound and Columbia River Sections of the Society of American Foresters have already passed motions to ask the national Council of the SAF to forestall any national legislation on forest tree seed until the profession has had a chance to study all proposals for national legislation and certification rules. They have sought support of other sections of the country for this position. A subcommittee in the Division of Silviculture, Society of American Foresters, has been actively studying seed certification in the various regions.

The buyers, sellers, and research men concerned with forest seed in the western United States have voiced their concern through the Western Forest Tree Seed Committee. They are working toward effective local seed certification and do not desire national legislation or national seed certification rules at this time.

Their efforts in seed certification have been directed toward establishment of a local, nongovernmental organization widely supported by western forestry groups to certify the origin of natural seed.

What Should Be Done?

The major forest regions should develop their own tree seed certification programs on regionwide bases. Federal legislation or national certification standards are undesirable. There appears to be no national problem in the forest seed industry today which requires legislation. The only organizations pressing for such legislation are nonforestry organizations of law enforcement officials.

Forestry groups elsewhere in the nation, then, are asked to study the forest seed certification question in their locality. What would be the impact of present proposals on foresters and seed dealers in their respective localities? What are the detailed plans for implementing these proposals? How and by whom will the origin of tree seed be verified? At what cost? If they agree that federal legislation and national certification standards are premature for them, they can take most effective action through their Chapters and Sections of the Society of American Foresters.

WESTERN FOREST TREE SEED COMMITTEE,
WESTERN FORESTRY AND CONSERVATION ASSOCIATION

Foresters Urged to Express Views on Price Reporting

The U. S. Department of Statistical Reporting Service is currently requesting its officials in each of the various states to submit information as to whether there now exists a forest products price reporting service within each state (conducted by others than themselves) and to give opinions as to whether such a service should and could be provided. The responses to this request will form the basis for a "study of the practicality and feasibility of establishing a forest products price reporting service within each state." Congress has appropriated $15,000 for this study to be completed this year.

This action should receive the attention of foresters everywhere. The potential effects of such a study are great, and if action is to be taken, professional foresters should be prompt to express their views on this subject and to exert their influence in the direction of such action.

The subject of whether or not price reporting of forest products on a statewide basis is practical or feasible calls for consideration of a number of factors. For ease of explanation as well as to provide a basis for comments, comparisons can be made to price reporting of agricultural commodities with which we are familiar. My general observations and comments are listed below:

1. Very few, if any, of the agricultural commodities now covered by price reporting are subject to the market variation extremes of forest products. In spite of variations in demand and price, few of these commodities go completely unmarketed, hence it would seem that there is always, under almost *any* circumstances, a price to be reported. This is definitely not true of many forest products. Under many circumstances of kind, quality, location, size, and/or presence or absence of using industries, there may be no market at all for a product which under differing circumstances might be readily salable. Such variations in the case of forest products can and do occur even within localized areas smaller in size than ordinary counties. For many species and kinds of products, there is a market for only a part of the available supply at present.

2. Most agricultural commodities are subject to harvest when ripe or at predictable rates throughout the year. Both supply and demand have some stability and the supply-demand relationship can be studied

and used as a basis for predictions as well as an explanation of existing price structures. Within the area of a state, and even more so within smaller areas, this is not true of forest products. Forest product harvesting can be hastened, delayed, or defererd for large numbers of years. The needs for and uses of certain species of wood can change completely within a matter of months even by an industry continuing to use wood and to produce the same end product! This is not common, but unfortunately, it is also not too uncommon an occurrence.

3. Most agricultural commodities are produced on land which has been made easily accessible, are subject to more easily applied methods of quality control during production, and are produced for markets representing specific uses which are slow in changing. Forest products are subject to extreme variations in physical accessibility, quality, and use, each of which factors influences the economic values at point of origin and point of use.

4. There is a *very* long period of time required to grow forest products as compared to any agricultural commodity now covered by a price reporting service. This is of the utmost importance, as it points out the seriousness of any net effect of price reporting which might encourage overcutting or the harvest of immature timber, or which might tend to discourage private forest management by supplying only one part of the many factors which must be considered by the private landowner in deciding for or against this long term commitment of his land.

These comments are made, not in opposition to price reporting of forest products, but in order to indicate some of the problems and special circumstances involved. Price reporting might be of primary importance in spurring the interest of private landowners in forest management. On the other hand, if extreme caution and care were not exercised, the unintended net effect might be harmful, and repair of damage done could be extremely difficult.

It would seem that the price reporting of forest products might be more practical and entail many less problems if confined to a very localized area, possibly not to exceed a few counties in size. This, it would seem, might also be very feasible as a project and service of local agencies or organizations.

As noted above, this study is to be completed *this year*.

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Comments on "Value of Licensing Questioned"

In the July 1961 issue of this JOURNAL, Allen Neff[1] questions the value of licensing foresters. Some of his questions have been asked by many other foresters also. They are good questions, express a sincere doubt, and deserve a good answer. This is hard to do in a Points of View article for, although the questions are short and simple, the answers are neither.

Mr. Neff wants to know how licensing got started and how it can be stopped. Licensing started in the 1840's when several states, by public demand, passed restrictive legislation aimed at curbing certain vicious medical practices. It gained impetus during the 1850's and 1860's when the American Medical Association, the National Pharmacy Association, and the Civil Engineering Society discovered that a Code of Ethics and the censure power of their organizations could not adequately protect either the public, for whom the members worked, or their own more ethical members from the malpractices of some members. All succeeding professional and occupational organizations have discovered this same condition within themselves and ultimately have strongly supported licensing as the most practical means of protecting the public from incompetents and malpracticers. The Society of American Foresters recognized this condition nearly thirty years ago. We have been very slow in taking the necessary steps to help remedy this situation.

As for the statement "that everybody else is doing it and we darn well better not be left out in the cold," Georgia passed the first state licensing law in 1951 after more than ten years of debate. By 1961 four additional states had passed licensing laws. If this rate of progress continues, few present members of the Society will live to see license laws in fifty states.

The licensing of a professional and/or occupational business is "for the benefit and protection of the public." If the proponents, speaking on this subject, have so stated and then proven only its value to the profession we have done all foresters a disservice. This, however, I do not believe and suggest a careful review of the printed matter pertaining to licensing.

Any law regulating the actions of members of a profession or business is passed for the benefit of the public by the public's representatives. It is, also, beneficial to the body of members so regulated. If this were not so licensing would be an evil thing and not to be tolerated. So let's be honest—licensing is not only for the benefit of the public but also for the benefit of most of the members so licensed.

Libel laws in all states in our union are specific and deal severely with offenders. Consequently we cannot publish facts—case by case or incident by incident—relating to the public's need for protection, as requested by Mr. Neff. We are fortunate that there are so few cases, that so few of our members stray from honorable dealings with the public, with their employers, and with each other.

I am proud of our record. Nevertheless, if Mr. Neff (and all others like him) will diligently inquire

[1]Neff, Allen W. Value of licensing questioned. Jour. Forestry 59:517-518. 1961.

among our membership someone will tell him of foresters deliberately shading timber cruise reports, of foresters negligent (or possibly ignorant of exact procedure) in running of property lines, of foresters involved in unethical job bidding, of foresters (both publicly and privately employed) selling opinions to private persons and companies whose judgment has subsequently proven wrong and against whom no redress may be had by the injured parties, and of nonforesters doing forestry work for which they are not properly qualified. There are other incidents which careful inquiry will bring to light. Only cases which have actually gone through court procedure could be published here.

We have a Code of Ethics and machinery within our Constitution and Bylaws for censuring members violating it—if the matter is brought forcefully to the attention of the Council and in the proper manner. This machinery is seldom used. Furthermore censure by ourselves in no way prevents a man from continuing his way of life—to the detriment of the public and our ethical members. This condition is partly engendered because the public has no adequate measure of a "Forester." How many people in Portland, Salem, or Eugene could tell you what we, the Society, think a forester is? Even the U. S. Forest Service doesn't designate their man on the ground—the man most often meeting the public—a forester. His title is District Ranger. A license law will help the public to recognize a forester as someone different from a cruiser, scaler, tree doctor, or fire protection warden.

How often does a forester appraise timber land or negotiate a real estate transaction? How often does a forester practice land surveying in his work? Does a forester ever advise or prescribe a means of control for insect pests or plant diseases? These actions are, for a forester, strictly against the laws of Oregon. A forester must be licensed in another category (of which there are more than sixty) to do these things. It is time to stop this circumscription of our natural functions by defining ourselves legally.

Proponents of licensing want the term "Forester" to mean something to the public; they want a good public image just as much as the opponents do. They want to do this with a positive course of action:

First—by legally defining for the public what we purport to be.

Second—by creating a floor under us by which the public can judge our acts.

Third—by creating a self administered (not by governmental control) means, state by state, of enforcing minimum standards of competency and integrity.

These desires are the same for all foresters. The difference is in the approach to the problem. We favor a concrete course of action proven through one hundred years of use in this country—licensing. We think our wants will not be realized merely by hoping no person will let self gain influence his actions contrary to our Code of Ethics and the good of the public.

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Member, Committee on Registration and Licensing of Foresters, SAF, Coquille, Ore.

Book Reviews

Logging Railroads of the West

By Kramer Adams. 157 pp. Superior Publishing Company, Seattle, Wash. 1961. $12.50.

In the early 1920's in the logging woods of the West there were some 460 logging railroads, with 2,700 miles of track and 1,230 locomotives. At that time, the railroad was the very heart of a logging operation. The woods railroads which remain today are dieselized log haulers, not logging railroads. They operate as main lines from reloads in the woods; the building of spurs to individual landings, as in the highball steam era, is now a lost art. So this book, a comprehensive review of the old steam days, is most timely. While it is titled *Logging Railroads of the West* it means steam logging railroads since the electrified Red River Railroad was the only significant exception.

Kramer Adams has done an excellent job on a difficult subject as I well know. Early day loggers were interested in getting logs, not in writing about the job, and so the written record is dim and difficult to find. The book is a history of big-time logging as well as logging railroads, even though mention of logging as such is necessarily brief, and subordinated to the railroad. You couldn't have a logging railroad without logging, and Adams has dredged up a good deal of logging history along with his Shays and Heislers. This is a good book, which I greet with enthusiasm, having worked in Northwest steam logging camps when there was no such thing as a diesel locomotive or truck in the woods. As Adams points out, the decline of the steam logging camp and its railroad was inevitable; it simply ate itself out of business. A tremendous stand of high quality high density timber was required to support a railroad show; after the best of those stands were cut, there were simply no fresh timber frontiers for steam trains to conquer—trucks could do it better.

Kramer Adams has a good sense of humor and a nice turn of phrase as illustrated by several chapter headings. The Uncommon Carriers, which tells of the ingenuity, the bravado, the guts of the steam loggers; Joining the Birds, which is railroad slang for prompt and prudent departure from a train about to hit a rock slide, fall into the ocean, or go through a bridge—any such dismal endeavor being daily routine on logging roads.

The section on Inclines illustrates the logger's gift for turning potential adversity into advantage. These up and down railroads as Adams deftly calls them saved many miles of costly construction. They were all the rage with loggers in the 1920's and perhaps would warrant a more lengthy discussion than given here. A possible inclusion might have been the Algoma operation on the rim rock north of Klamath Falls, one of the best and busiest.

A remarkably varied and thoroughly typical set of pictures has been rounded up to give a good cross section of steam logging. Inevitably a choice must be made on the kind and numbers of photos to include, else the book would grow to monstrous proportions. One that had to be left out I wished might have been added—picture of one of the first logging engines in Washington, allegedly in Mason County early in the 1880's. This improbable little runt ran on wooden rails and because of its very modest muscle was known both derisively and affectionately as The Ant. It was typical of loggers, first to make it run at all, and then to describe the results of their efforts by such an appropriate name.

Adams has rendered a real service to the history of the industry by patiently putting together a prodigious roster of western logging roads. The comprehensive list attests both the thoroughness and the difficulty of the task.

A couple of years ago I said, "When Booth Kelly's mallets charged up the 5 percent grade out of Wendling on a frosty morning with 20 skeleton cars banging along behind, there was a majesty of sight and sound the western roads will never see again." From my biased point of view Kramer has done an admirable job of recalling these highball days; not just the transport of logs, but a good cross section of big-time logging itself. This is more than a pictorial history, it is a thorough reference work. It is highly recommended to those who are interested in western logging, as well as to *aficionados* of a very ingenious kind of railroading no longer to be seen.

W. F. McCulloch
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Pulp and Paper, Chemistry and Chemical Technology (2nd ed.) Vol. III: Paper Testing and Converting

By James P. Casey, xxvii+862 pp. +113 pp. index. Illus. Interscience Publishers, Inc., New York and London. 1961. $29.50.

In the concluding volume, *Paper Testing and Converting*, of the new three-volume edition of his book, Mr. Casey maintains the high standard of the first and second volumes.

There are eight chapters in the third volume, namely: Properties of Paper, Use of Statistics in the Paper Industry, Pigment Coating, Printing, Laminating and Corrugating, Saturation of Paper and Paper Plastics, Coating with Resinous Materials, and Resins. There is a total of 24 chapters in the entire book and each volume is separately indexed.

In the first, and also the longest (268 pages), chapter of this volume the significance of the com-

mon paper properties and the relationship between these properties and the use requirements of the paper are discussed. The main headings in this important chapter are introduction to paper testing, physical properties of paper, sheet strength, optical properties, chemical properties, electrical properties, and microscopical analysis. The short chapter on statistics illustrates some of the methods useful in analyzing paper testing data.

The remaining two-thirds of the text are devoted to the various aspects of converting. Paper coating is an important part of the paper industry. It is a wide field which includes the application of many different types of coatings to the base paper. The chapter on pigment coating (202 pages) is concerned with the application of an aqueous mixture of pigment and adhesive to the surface of the paper. The coating process, the types of coating process, coating adhesives, coating pigments, preparation of coating mixture, coating raw stock, applying coating to paper, evaluation of coated papers, and special coating processes, are the principal subdivisions considered.

Since a very high percentage of all paper is printed by some means or other it is necessary that the paper chemist understand the basic steps in the printing operation, complex and variable as they are. In the chapter on printing the various processes are discussed in some detail.

Laminating and corrugating are important parts of the paper industry. Under these two main headings are considered laminating processes, types of adhesive used, theory of adhesion and adhesive properties, aqueous adhesives, emulsion type adhesives, lacquer type adhesives, hot-melt adhesives, and corrugating.

The chapter on saturation of paper and paper plastics includes a discussion of saturation with latices and emulsions, saturation of paper with asphalt, oils, and waxes, paper plastics, and pulp-reinforced plastics, while that on coating with resinous materials deals with the surface treatment of paper with resinous materials. In the latter are considered the fundamental properties of films, machinery for coating with resins, coating with lacquers or solvent solution coatings, coatings with emulsions or latices, coating with organic solvent dispersions, coating with hot melts, extrusion lamination, and coating with water-soluble materials. The concluding chapter on resins is a short discussion on various natural and synthetic resins.

As the reviewer has pointed out in a previous review the writing of this three-volume book is a tremendous task for one man. In my opinion the author has done a good job of presenting the technical side of papermaking from a fundamental viewpoint.

IRVING H. ISENBERG
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Dynamics of Even-Aged Forest Stands

By M. S. Czarnowski. xiii+132 pp. Illus. Louisiana State University Press, Baton Rouge. 1961. $5.

Two basic hypotheses are presented by the author and developed into a system of dynamics of even-aged forest stands of unusual interest and scope, particularly to the research forester with some adeptness in mathematics. Some fifty-two numbered formulas plus a great number of algebraic expressions used in their derivation may make the reading slow and surely contribute to making this brief review inadequate since few of them can be repeated. Though the author modestly states that he makes no claim to solve all problems concerning the subject but that he intends to arouse the reader's interest in a system of considerable promise to future forest research and practice, his use of checks by means of empirical data establish a considerable measure of credibility in his findings. The reader may be justifiably concerned at times with some of the assumptions, approximations, and generalizations and should be stimulated to making further tests of the theories against empirical data involving other species, sites, and regions than those already studied.

The first major hypothesis was obviously developed by the author some years ago while he was still in Poland. Later the second major hypothesis was introduced and the two expanded into the continuous system of dynamics as herein presented and checked against American forest conditions, principally southern pine. The first hypothesis is stated as follows: "In pure, even-aged stands of a given species growing on land of identical site quality and under conditions of comparable competition for growing space, the number of trees per unit of land area is inversely proportional to the square of the mean height of the stand." A logical consequence of this hypothesis is that in a normal even-aged stand, the number of trees on an area equal to (mean height)^2 is constant for a given species on a given site. This number or constant varies with site, being progressively lower for the poorer sites, and is referred to as the "site indicator," a value of considerable significance throughout the following chain of mathematical developments. A second expression derived from this is that of a "crowding factor" or the ratio between an actual number and the normal number of trees on a given area.

The second major hypothesis is given as "The average diameter breast high in a stand is directly proportional to the mean stand height reduced by the height of measurement of diameter and inversely proportional to a crowding factor enlarged by the value 1." This hypothesis is based primarily on the assumption that mean diameter growth of an open-grown tree is about twice that of the average tree in a normally stocked stand.

Both hypotheses are checked by means of empirical data of both European and American origin. The first one is shown to be a good generalization of many of the current theories on spacing, including such well-known ones to the American reader of Chisman and Schumacher, and Bistrup.

Height and height growth are

then investigated as they are related to "site indicator" and age and a mathematical expression derived for site indentification complex. The determination of the maximum volume per unit of land area, which is closely analogous to normal volume, is the next logical step by the combination of the two first major hypotheses involving site indicator, crowding factor, diameter growth. Maximum volume as so defined is stated simply as $M_{max} = k H' N^w$ where H is the mean height, N is the site indicator and k and w are constants dependent upon the species with w commonly equal to about ½. A "compactness factor" is then introduced, consisting simply of the ratio between the actual volume and the maximum volume. By this time a wide variety of constants and expressions have been introduced and two chapters are used to show how the coefficients can be determined and the formulas applied.

Further development in the chain of theory includes a treatment of growth particularly as a function of the compactness factor and a discussion of crown-length ratio as an index to degree of crowding. The first of these is shown to be practically identical with the notions of Gehrhardt as introduced to the American reader by Duerr and Gevorkiantz.

Practical applications of the consolidated theory are found in solving the problem of the best intensity of thinning and in the general area of regulation of cut.

WALTER H. MEYER
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Forest and Shade Tree Entomology

By Roger F. Anderson. 428 pp. Illus. John Wiley & Sons, Inc., New York. 1960. $8.50.

This book, according to the flyleaf, "covers both aspects (i.e. basic principles and information on individual insect species and problems) of the subject in one volume." In my opinion, this is impossible in a profusely illustrated 428-page book. This becomes evident when one peruses the first 92 pages which attempt to cover insect morphology, classification, abundance (ecology), control, insecticides, methods of application, and forest insect surveys. A serious error was noted on page 33, the lacewings (Neuroptera) being included in the order Hemiptera.

The treatment of individual insects and damage keys seems generally good, with many excellent illustrations. However, in attempting to achieve broad coverage it falls short of wide usefulness and oversimplification reduces its effectiveness. Errors as well as omissions also occur from condensation (e.g. p. 173. The distribution and biology recorded for *Evagora* [*Recurvaria*] *milleri* includes information for a complex of species).

More a manual than a text, the most serious criticism is the superficial treatment given the insect ecology, the interrelationships of forestry and entomology, and practical guide lines for control available to foresters. The control information given for each insect species is often theoretical and the ramifications of use of chemical controls are not discussed adequately.

R. W. STARK
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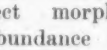

Things To Do In Science and Conservation

By Byron L. Ashbaugh and Muriel Beuschlein. 163 pp. Illus. The Interstate Printers and Publishers, Inc., Danville, Ill. 1960. $2.50 with 20 percent discount on 2 or more copies. (Sponsored by the Conservation Education Association in cooperation with the American Nature Association.)

In evaluating *Things To Do In Science And Conservation* this reviewer wishes to point out two factors which might be overlooked by more casual critics who consider the wise use of our natural resources so vital to our welfare that this should be taught as a separate subject in our school systems and are further concerned with the delay at which this is being accomplished. There are, however, similar pressures on our school authorities by *other* groups who feel that *their interests* are of equal importance. The resultant need to "draw-the-line" somewhere plus the scarcity of qualified instructors helps to account for the resistance in some areas to the inclusion of conservation education as such in school curriculums. In an apparent attempt to circumvent this and to create an awareness of the need for wiser use of our natural resources the authors suggest that conservation be introduced with the teaching of science in the classrooms. It was for this purpose that *Things To Do . . .* was written; where such an integration is possible the book will be helpful to teachers at all educational levels.

The book consists of two parts. The first, on natural resources, contains chapters on space, air, the sun, soil, water, minerals, plants and animals; the second, on man-developed resources, is devoted to electricity, synthetics, and nuclear energy. Each chapter presents facts or concepts on the basic resources, provides methods of demonstrating these facts, suggests individual or group projects, gives questions designed to broaden the student's awareness of the various concepts and their possible conservation applications and has a short bibliography if further study is desired.

The book is indexed and contains a two-page list of sources of information and teaching aids. The Forest Service, the Soil Conservation Service, and the U. S. Department of Agriculture are omitted here while appearing in one or more of the chapter bibliographies. No mention whatever is made of materials available from the Fish and Wildlife Service nor to those from the various state agencies concerned with agriculture, conservation, fish, forests, game, minerals or water problems.

There are some seventy line drawings as illustrations—the qual-

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ity and usefulness of which are exceptionally doubtful. Included are some statements, experiments, and interpretations that this reviewer might question. Readers of the JOURNAL, for example, will be pleased to know that "Forestry science has progressed somewhat in the last few years."

Conservation education specialists and many science teachers may find *Things To Do . . .* quite elementary. Foresters, fish and wildlife technicians, and soil and water conservationists may dislike the brevity allotted their respective fields. Ardent naturalists may deplore a writing style which appears quite uninspirational. Yet, the authors have done a good job of compressing a wide and important field into a compact package in the language of, and for the use of, school teachers at various grade levels and for the purpose for which the book was written. This must not have been an easy task since each of the eleven chapters could easily have been a book unto itself. In fact, it is this reviewer's hope that the sponsors might well consider this as a future project.

Despite its limitations, *Things To Do In Science and Conservation* is a book which merits the attention of conservationists interested in the field of education and in contact with teachers and school authorities. It is reasonably priced under present conditions and makes a nice gift either for giving or getting. Speakers on conservation subjects should find here many ideas helpful to them in preparation for their talks.

HARRY WM. DENGLER
University of Maryland, College Park

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The Western Forest Industry: An Economic Outlook

By John A. Guthrie and George R. Armstrong. 324 pp. Illus. The Johns Hopkins Press, Homewood, Baltimore 18, Md. 1961. $6.50.

This monumental and timely work by J. A. Guthrie, director of the Bureau of Economic and Business Research at Washington State University, and G. R. Armstrong, research associate, State University College of Forestry at Syracuse University, was made possible through a grant made by Resources for the Future to Washington State University.

Based on study of basic statistics and interviews with informed people of many agencies concerned with the West Coast Forest Industry problems the study carefully constructs a factual picture of the resource base and its use. In addition, future trends have been indicated though extreme care is exercised to qualify and explain the basis for projecting future supply and demand conditions. In developing foundation material the authors lead the reader through a very clear presentation of the physical, population, forest, and economic factors involved in Alaska, British Columbia, and the eleven western states; they then consider the Forest Products industries of the past and present in order to project industrial development into the future. The lumber, pulp and paper, and veneer and plywood industries are projected to the year 1975; considerations of supply are presented, the effects of policy are discussed, and conclusions carefully drawn.

This book is overflowing with useful statistics and pertinent history; the projections and conclusions are obviously based on painstaking and critical review by men of the utmost ability in this field. Available in the office of the practicing forester of the Pacific Slope, its use will undoubtedly prove richly rewarding. *Western Forest Industry: An Economic Outlook* is a classic of our times. The authors are to be congratulated on a superlative contribution.

G. H. SCHROEDER
Crown Zellerbach Corporation, Portland, Ore.

Current Literature

Compiled by LOIS MCALLISTER, *Assistant Librarian, State University College of Forestry at Syracuse University*
Range Management Section Compiled by NELLIE G. LARSON, *Library, U. S. Department of Agriculture*

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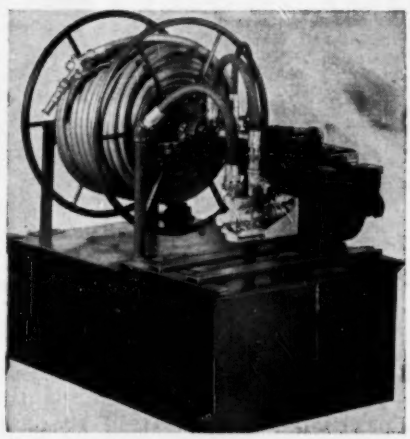

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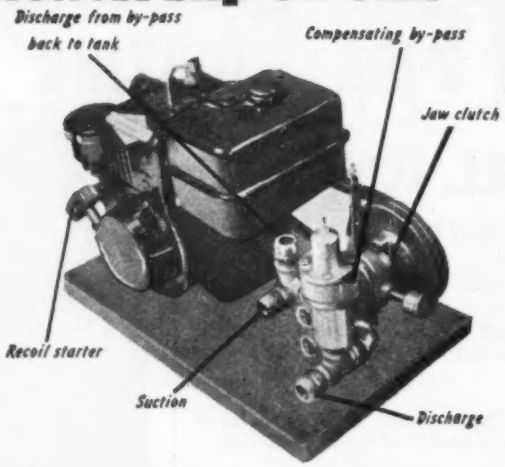

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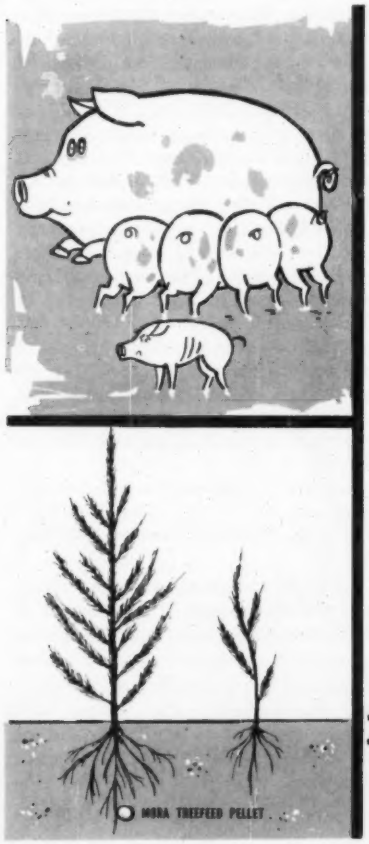

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Most popular arborists' saw made. With 26 or 28-in. blade, 6 points per inch, beveled forward. No. 27W $9.75 and No. 28 $10.50 delivered.

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Council's Column

Further Comments on Society Endowment

The January 1961 Council's Column constituted a report to the membership of the Society of American Foresters by a special committee charged with the responsibility of developing an endowment program for the Society. The author of this current Column had been designated as chairman of the Endowment Fund Committee, the members of which were chosen from the ranks of past presidents of the Society. The January report detailed the need for such a fund, designed to provide annual income for financing significant studies and other projects of importance to the profession and the Society.

An initial goal of $250,000 was set for the fund-raising program, and the first step was taken last winter in the form of a general solicitation of the Society membership. This initial step involved the mailing of a form letter appeal which accompanied the billing for 1961 dues. Response to this appeal was far from overwhelming, with a total contribution of approximately $2,200 from 276 donors, for an average gift of about $8. These returns, reported in the account of the April 1961 meeting of the Council (Jour. Forestry, June 1961, p. 465), prompted a pointed comment by Lloyd Thorpe, long-time advertising representative of the JOURNAL OF FORESTRY. Writing in the Letters section of the August 1961 issue of the JOURNAL, Thorpe recorded the following score for the endowment compaign: "88/100 of 1 percent of goal achieved; average contribution per member 13⅓ cents," and queried: "Who's missing? What's missing? Why?"

The status of the Endowment Fund program was reviewed at the April meeting of the Council, which took cognizance of the need for direct support of the program by unanimously adopting a substitute for By-law 67 with the following specific provisos:

1. The Endowment Fund of the Society shall be established by the combination of the Permanent Fund (then in the amount of $5,525) and such sums as have been given specifically for endowment fund purposes.

2. All interest earned on Endowment Fund investments shall be added annually to the principal of the fund until it reaches a predetermined goal (initially $250,000) or until the Council shall direct the use of such annual income for some other specific purpose.

3. The Endowment Fund shall also be increased annually through contributions for that specific purpose, and through the addition of such percentage as the Council shall direct, but not less than ten (10) percent, of both the interest received from other available investments and the net annual earnings of the Society.

4. The raising of funds for Endowment Fund purposes shall be under the direction of a committee of past presidents of the Society, acting under the chairmanship of a member of the Council appointed by the President.

The Council also directed the current chairman of the committee to prepare a "working plan" for the development of the Endowment Fund. Such a plan was duly prepared and approved by the Council at its October meeting.

Essentially, the "working plan" involves establishing the SAF Endowment Fund Program on the same basis of annual giving as is being employed in the increasingly successful Alumni Fund drives conducted by a growing number of American colleges and universities. Over the past ten years, one institution of my acquaintance has succeeded in obtaining a consistently increasing participation of its alumni from about 15 percent of the total number solicited in 1951-1952 to 41 percent in 1960-1961, while the average gift has increased during this same period from $8.50 to $16.50 per donor. With less than one-tenth the solicitation base of the Society, this school received contributions in excess of $8,500 from its alumni in 1960-1961.

Solicitation for the Endowment Fund will be entirely independent of billing for annual Society dues. It will involve an initial appeal in November to the entire membership from the President, and several subsequent follow-up mailings during the winter and early spring to those members who have not by then responded to the earlier solicitations. It is also planned to enlist the cooperation of a substantial group of regional representatives, with a particular enthusiasm for the project, to develop the program at the Section and Chapter levels. It will be some time before the proposed plan can be put into full operation, but it is intended to have the project off to a running start this winter.

It is the earnest hope of the Council and the Endowment Fund Committee that the current campaign will receive a ready and wholehearted response from a major proportion of the Society membership. The entire SAF family is urged to support this effort to develop a more effective Society program.

GEORGE A. GARRATT

N. Y. SECTION meets. From *left* to *right* are Leland Peterson, works manager, Jamestown Sterling Corp., speaker at the Thursday night dinner; Edward J. Whalen, chairman of the New York Section; Charles Connaughton, San Francisco, national president, SAF; Curtis Bauer, toastmaster; and Robert Stickney, program chairman for the sessions.

N. C. Foresters Inaugurate Radio Programs

As a joint venture the North Carolina Piedmont Forestry Club and the North Carolina Piedmont Chapter have undertaken the production of seven radio tapes on the following areas of forestry: General Forestry, Cull Hardwood Control, Watershed Management, Thinning, Tree Planting, Protection, and Forest Products. Committees were formed to write the scripts and another committee edited and taped the scripts with assistance from several radio stations. The subject was especially localized for the Piedmont of North Carolina and aimed at small woodland owners. Enough copies of the tapes will be made to enable any one radio station to run the entire series and coverage is expected throughout the entire Piedmont. It was found that a 10-minute program was best and will be more widely used by most stations. To my knowledge, this is the first such undertaking by any Chapter or Forestry Club. The program will be rerun from time to time and should have a long-lasting effect. This represents cooperation between federal, state, private, and industrial foresters. In the future, it is expected that the above programs will be adapted for television.

R. M. BOYCE

New York Section Meets

About 100 foresters from Canada, New York, and Pennsylvania gathered at Jamestown, N. Y., on September 14 and 15 for the annual summer meeting of the New York Section, Society of American Foresters.

The meeting was highlighted by the attendance of Charles Connaughton, national president of the SAF.

The theme of the meeting was "Current Utilization and Management of High Quality Hardwoods in Western New York." On September 14 the group visited a number of hardwood woodlots in the vicinity of Jamestown, and on September 15 visited some of the furniture companies in Jamestown, climaxed with a trip through the Furniture Mart. This seven-story building is used as a main showroom by all the local furniture manufacturers to show their various styles of furniture and is only open for special tours and for buyers from many furniture stores throughout the country.

Alaska Section Holds Annual Meeting

The 1961 annual meeting of the Alaska Section was held at College, Alaska (the University of Alaska near Fairbanks) August 28—September 1. Held in conjunction with the Twelfth Alaska Science Conference, the program included the presentation of 15 papers in three forestry sessions of the Science Conference under the chairmanship of State Forester Earl Plourde.

The Alaska Section's program included a field trip to the Bonanza Creek Experimental Forest and adjacent areas so that members could view typical Interior Alaska forest types and activities. The program also included a visit (and brief stay) at the famous Malemute Saloon followed by a barbecued reindeer dinner at the Cripple Creek Resort.

The business meeting was held August 31 and included a review of the Section's current programs and a discussion of various policy issues and other forestry matters. The annual

52nd Western Forestry Conference

The 52nd Western Forestry Conference, under the auspices of the Western Forestry & Conservation Association, will be held at the Benson Hotel, Portland, Ore., December 6-8, 1961.

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MEMBERS of the Gifford Pinchot Chapter, Allegheny Section of the SAF, before Grey Towers Estate, Pinchot's home, Milford, Pa., during a meeting of that group on September 15.

program was planned and arranged by Von Johnson, Robert Gregory, and William Sachek.

The Alaska Section consists of three Chapters: Interior, Juneau, and Ketchikan; all were represented at this meeting. Current officers are John Sandor, chairman; Frank Lound, vice chairman; and Carl Wilson, secretary-treasurer. Executive Committee members are: Mason Bruce, Theodore Schlapfer, Von Johnson, and Richard Quintus.

Chapter Suggests Pinchot Memorial

In commemoration of the 15th anniversary[1] of the death of Gifford Pinchot, the Pinchot Chapter of the Allegheny Section, SAF, on September 14, 1961, made a pilgrimage to Milford, Pa., the birthplace and ancestral home of Pinchot. At the luncheon meeting the Chapter was addressed by Professor Nelson S. Brown, personal friend and former coworker of Pinchot. Also attending as guests were the Mayor of Milford, Norman Lehede, and Fire Chief Dr. H. D. Johns, both friends and neighbors of the "Governor," as he is still known in his home town. Reginald Forbes, member of the Pennsylvania Forestry Commission, also made some remarks to the group.

Rather than place the customary flowers on the grave, the Chapter made a cash donation to the Milford Fire Company's building fund, in memory of Gifford Pinchot. E. F. McNamara, Pennsylvania Department of Forest and Water's district forester for the area and also chairman of the Pinchot Chapter, recalled the close association Pinchot had with the Fire Company, and the continued assistance and cooperation they still give the foresters during fire season.

Following luncheon, a tour was made of Grey Towers Estate, the home of Pinchot. A visit was also made to the former site of the Yale School of Forestry's summer camp and Pinchot's grave.

The Pinchot mausoleum is located on a small piece of private ground within the Milford cemetery, and therefore, not subject to cemetery rules and regulations. The reason evidently being that Pinchot stipulated that the grass and weeds should not be cut or the trees trimmed or pruned on his plot. For a while, the local people say there were complaints, especially from visitors; that it looked unkempt and forgotten. But now the seedlings have pushed up and shaded out the grass and weeds and the area is taking on a look which is what the Governor probably had in mind when he made his will.

At the Chapter business meeting, Professor Brown was made an honorary member of the Pinchot Chapter. It was also proposed and passed by the membership that thought should be given by the parent Society to the possibility of having the Gifford Pinchot home and estate, which consist of numerous plantings, made into a national forestry shrine, as the cradle of American forestry.

H. R. FRANTZ
Secretary-Treasurer

John B. Cuno (1894-1961)

John Brown Cuno, 66, died in Berkeley, Calif., July 23, 1961.

Born December 29, 1894, in Brooklyn, N. Y., he was graduated with the B.S. degree from Pennsylvania State College in 1915, and received the M.F. degree from the New York State College of Forestry in 1922.

He served as an officer with the Corps of Engineers, U. S. Army, during World War I and entered the Research Branch of the Forest Service

[1]Pinchot died October 4, 1946.

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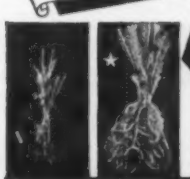

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in 1920. He retired in 1950.

Mr. Cuno had been a SAF Member since 1928.

Daniel Den Uyl (1898-1961)

Daniel Den Uyl, associate professor of forestry and conservation at Purdue University, died September 21 at Lafayette, Ind.

Born in Holland, Mich., March 25, 1898, he received the B.S.F. degree from Michigan State University in 1922, and the M.F. degree from Cornell University in 1926.

He served with the U. S. Forest Service on the Shenandoah, Monongahela, and Ozark National Forests prior to joining the Purdue staff in 1928. He became a member of the SAF in 1932, was vice chairman of the Central States Section in 1941, chairman in 1942, and a member of the Committee on Forest Types 1951-1954.

Ralph T. McAvoy (1918-1961)

Ralph T. McAvoy, 43, forester in charge of timber management planning on the Nezperce National Forest, Idaho, died of a heart attack on August 22.

Born January 30, 1918, in Butte, Mont., he attended Montana State University where he received his B.S. degree in 1948. He was employed by the Forest Service with assignments on the Kootenai and Gallatin National Forests in Montana, and since January 1961 with the Nezperce.

He served in World War II and saw action in the Aleutians and North Italy campaigns.

Membership Applications and Advancements

Proposals for admission, advancement, and reinstatement received in the Society office during the month of September are listed below.

Action on the eligibility of those proposed for membership as listed below will be taken by the Council as of November 30, 1961.

Communications from the voting members regarding the membership eligibility of these persons should be received in the Society office prior to that date.

Allegheny Section

Junior Grade

Students Eligible for Automatic Advancement

PENNSYLVANIA STATE UNIVERSITY
Brubaker, D. P.

WEST VIRGINIA UNIVERSITY
Hayhurst, C. K.

Appalachian Section

Junior Grade

Handley, D. M., Assoc. Forester, S. Leigh Wilson & Assoc., Florence, S. C. (Affiliate 1959).

Hollowell, A. R., Forester, Weyerhaeuser Co., Plymouth, N. C. N. C. State, BSF, 1960.

Member Grade

Mitchell, W. P., Pulpwood Dealer, Kinston, N. C. (Reinstatement).

Affiliate Grade

Reamer, L. D., Ass't. Forester, Clemson College, Clemson, S. C.

Salley, M. G., Field Ass't., Clemson College, Clemson, S. C.

Central Rocky Mountain Section

Junior Grade

Collins, R. A., Ass't. Ranger, USFS, Pagosa Springs, Colo. Colo. State, BSF, 1956.

Elliott, G. E., State Forester, Bur. of Land Mgmt., Cheyenne, Wyo. Colo. State, BSF, 1952.

Lancaster, K. H., Ass't. Dist. Ranger, USFS, Medicine Bow, Wyo. Colo. State, BSF, 1939.

O'Neil, G. J., Ass't. State Forester, Rapid City, S. D. (Reinstatement).

Tice, R. W., Dist. Ranger, USFS, Alamosa, Colo. (Reinstatement).

Affiliate Grade

Parsons, W. A., Forester, USFS, Fort Collins, Colo. (Reinstatement).

Central States Section

Student Grade

PURDUE UNIVERSITY

Armbruster, P. E.	Harnisch, F. M.
Boundy, G. H.	Hotaling, W. L.
Burkhart, L. J.	Hughes, M. M.
Cox, R. L.	Layton, D. O.
Cunningham, K. M.	Vierk, G. A.
Dehart, W. K.	Ward, R. A.
Devere, M. L.	Wengert, J. P.
Forville, D. R.	Willis, J. H.
Frye, L. R.	Wolf, G. L.

Junior Grade

Students Eligible for Automatic Advancement

PURDUE UNIVERSITY

Irwin, J. G.	Kirkman, R. S.
Vergin, D. L.	

Columbia River Section

Junior Grade

Edinger, W. F., Forester, Bur. of Land Mgmt., Medford, Ore. State Univ. College of Forestry at Syracuse University, BSF, 1950.

Woodworth, W. W., Logging Supv., Crown Zellerbach Corp., Grand Ronde, Ore. Ore. State, BSF, 1942.

Gulf States Section

Student Grade

LOUISIANA POLYTECHNIC INSTITUTE

Bazer, J. P.	Kent, J. E.
Blackman, B. G.	Kirk, T. K.
Briggs, W. E.	Liles, R. L.
Bryant, D. E.	Martin, D. H.
Cochran, C. W.	McNeill, E. R.
Crain, J. M.	Miller, J. W.
Files, B. D.	Rockett, J. V.
Fornea, W. G.	Screpetis, G. D.
Foshee, J. W.	Thomas, H. M.
Griffin, J. R.	Trussell, G. R.
Hart, J. C.	Vandegrift, J. C.
Henderson, L. G.	Veech, J. A.
Hilderbrand, J. W.	Whisenhunt, E. D.
	Williams, S. L.

Junior Grade

Bryant, J. M., Forester, The Pardee Co., Minden, La. (Reinstatement).

Affiliate Grade

Foreman, J. J., Forester, USFS, Hampbill, Texas.

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Hood, F. E., Dist. Forester, Southland Paper Mills, Inc., Lufkin, Texas.
Martin, J. W., Dist. Forester, Kirby Lbr. Corp., Kountze, Texas.
Pfleider, T. A., Dist. Forester, Southern Pine Lbr. Co., Pineland, Texas.
Short, J. J., Forester, Holly Springs, Miss.
Shropshire, F. W., Forester, USFS, Rolling Fork, Miss.

Intermountain Section

Junior Grade

Students Eligible for Automatic Advancement

UTAH STATE UNIVERSITY
Ashley, R. R. Evans, R. J.
Dutton, D. W. Jahnke, G. R.

Kentucky-Tennessee Section

Junior Grade

Eikum, R. L., 105 Longwood Rd., Bristol, Tenn. (Reinstatement).

Affiliate Grade

Fisher, R. G., Service Forester, Ky. Div. of Forestry, Williamstown, Ky.
Womack, L. W., Service Forester, Tenn. Div. of Forestry, Elizabethton, Tenn.

New England Section

Junior Grade

Brock, S. M., Ass't. Prof. Univ. of Maine, Orono, Maine (Reinstatement).
Sturgen, G. W., Grad. Research Ass't., Univ. of N. H., Durham, N. H. Pa. State, BSF, 1960.

Students Eligible for Automatic Advancement

UNIVERSITY OF NEW HAMPSHIRE
Ouellette, G. J.

New York Section

Junior Grade

Students Eligible for Automatic Advancement

STATE UNIVERSITY COLLEGE OF FORESTRY AT SYRACUSE UNIVERSITY
Bianchi, H. S.

Northern California Section

Student Grade

UNIVERSITY OF CALIFORNIA
Fowler, K. S.

Junior Grade

Students Eligible for Automatic Advancement

UNIVERSITY OF CALIFORNIA
Philpot, C. W.

Ozark Section

Junior Grade

Lowe, J. E., Ass't. Dist. Forester, Dierks Forest Inc., Nashoba, Okla. La. State, BSF, 1959.
Royce, W. C., 2/Lt. U. S. Air Force, Enid, Okla. Univ. N. H., BSF, 1961.
Shelton, R. K., Chief Forester, Townsend Lbr. Co., Stuttgart, Ark. (Reinstatement).

Students Eligible for Automatic Advancement

UNIVERSITY OF MISSOURI
Fallert, R. A. Gibbs, J. B.

Affiliate Grade

Buzbee, B. D., Dist. Forester, Ark. Forestry Comm., Dierks, Ark.

Southeastern Section

Student Grade

UNIVERSITY OF GEORGIA
Horne, V. W. Locklair, J. A.

Junior Grade

Gemmer, T. V., Dist. Procurement Mgr., Brunswick Pulp & Paper Co., Brunswick, Ga. Purdue Univ., BSF, 1955.
Phillips, H. J., Area Forester, Continental Can Co., Inc., Milledgeville, Ga. (Reinstatement).

Students Eligible for Automatic Advancement

UNIVERSITY OF GEORGIA
Alexander, R. E. Hitchcock, C. R.
Booth, W. S. Horne, V. W.
Brightwell, C. S. Kenimer, D. B.
Brooker, B. W. Lowe, C. A.
Brooks, J. H. May, B. L.
Cope, L. E. Preston, A. W.
Davis, J. P. Rogers, G. E.
Duncan, A. Sesco, J. A.
Fair, C. L. Strickland, H. A.
Glenn, P. M. Tobias, R. C.
Gowen, J. G. Weese, G. K.
Gregory, C. G. Worthington, L. A.

Southern California Section

Junior Grade

Mizelle, M. D., Fire Fighter Crewman, Calif. Div. of Forestry, San Pedro, Calif.

Upper-Mississippi Valley Section

Student Grade

IOWA STATE UNIVERSITY
Dykstra, G. F. Shattuck, R. H.

Junior Grade

Trembath, D. K., Pres., C. L. Cecil Timber Co., Duluth, Minn. Univ. Minn., BSF, 1950.

Students Eligible for Automatic Advancement

IOWA STATE UNIVERSITY
Howells, B. D. Kaney, D. W.
Whitmore, R. E.

UNIVERSITY OF MINNESOTA
Lindmark, R. D. Lytle, G. W.
Nicolls, W. R.

Washington Section

Member Grade

Olsen, C. F., Forester, USFS, Washington, D. C. (Reinstatement).

Wisconsin-Michigan Section

Junior Grade

Marsh, D. E., Ass't. Dist. Forester, Court House, Sturgeon Bay, Wis. Iowa State, BSF, 1958.

Students Eligible for Automatic Advancement

MICHIGAN COLLEGE OF MINING AND TECHNOLOGY
Battey, L. D. Norton, D. S.
Wright, C. J.

MICHIGAN STATE UNIVERSITY
Burns, R. Hartshorn, M. A.
Dishong, D. S. Miller, W. E.
Gondek, L. S. Smith, R. D.
Gustavson, R. J. Stancel, P. A.
Gutsch, R. E. Wood, K. H.

UNIVERSITY OF MICHIGAN
Reynolds, H. H.

No Section

Junior Grade

Wolf, W. E., 1/Lt., U. S. Army Aviation Co., Ft. George G. Meade, Md.

Corresponding Grade

Batalla, J. P., Forestry Eng., Cornella (Barcelona) Spain.
Lushington, J. R. F., Ass't. Cons. of Forests, Tanganyika Gov., Dar-es-Salaam, Tanganyika.
Torrico, M. T., Forestry Eng., Participant in a Program of ICA, Washington, D. C.
Justo, E. E., Forestry Eng., Participant in a Program of ICA, Washington, D. C.

Letters

Optimizing?

Please refer to the title of the article on page 644 of the September edition of the JOURNAL. Where did you find the word "optimizing?"

JAMES M. VARDAMAN
Jackson, Miss.

Mr. Meyer of the JOURNAL OF FORESTRY has forwarded a copy of your letter of September 20, in which you ask, "Where did you find the word 'optimizing?'"

For a moment I felt like the man who was suddenly asked, "Where are your pants!?" So I checked with the American College Dictionary (1959), and lo and behold, there it was, "optimizing," at the top of page 851.

My meaning of it is the second one given there: "to make the best of;" in my usage, to make the best of in a particular sense, as discussed in the second paragraph on page 650 of the JOURNAL for September. Perhaps I should have put this paragraph at the first of the paper.

"Optimizing" aside, I would appreciate hearing your comments on the paper.

RONALD BEAZLEY
Carbondale, Ill.

Liked August Issue

I want to commend the editors of JOURNAL OF FORESTRY on the special excellence of the August issue. . .

I hope that more "men of action" can be induced to take out time to tell what they have been doing that would be of general interest.

FRED R. MASON
Ogden, Utah

The August JOURNAL is excellent. It seems to me the articles are of the type the JOURNAL should be publishing, and are, in themselves, very well done. National Outlook, too, is fine. I think Vaux presented a good case against a SAF news periodical.

JOHN W. DUFFIELD
Nisqually, Wash.

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National Outlook

Work of Congress. The first session of the 87th Congress, which adjourned late in September, made something of a record for total volume of legislation enacted. But relatively few of the measures that came out of the legislative mill directly affected forestry or related activities.

One of the most far-reaching of the natural resource measures passed and signed into law was the Federal Water Pollution Control Act, mentioned in this column last month. Another important action established the Cape Cod National Seashore, first major national park project approved by Congress in nearly a dozen years.

Wildlife groups were pleased with the passage of an act authorizing an emergency loan of $105 million for the Bureau of Sport Fisheries and Wildlife to acquire wetlands for the preservation of continental flights of migratory waterfowl.

Congress also enacted legislation which will permit certain nongovernmental organizations (such as associations of water-users) to sponsor improvement works under the Watershed Protection and Flood Prevention Act.

Of regional importance was the granting of Congressional consent to an interstate-federal compact creating a regional commission to administer the water resources of the Delaware River Basin.

Of special interest to water-hungry areas of the country was an act to expand and extend the saline water conversion program of the Interior Department. This program of research and development is designed to find a low-cost method of converting salt water to fresh water and so to increase the water resources of the nation. A six-year, $75 million program was authorized.

A number of other bills concerned with natural resources were still pending when the Congress adjourned. Several of these had been passed by the Senate but had not been acted upon in the House—among them the Wilderness Bill, and a bill to establish Point Reyes National Seashore in California. Others, including proposals for a Youth Conservation Corps, water resources planning, multiple use for the national land reserve, establishment of a "National Conservation Policy," and several park or parkway projects had not yet been reported upon by Congressional committees, or, if reported out, had not yet been voted upon in the Senate or House.

All of the measures still pending will carry over to the second session of the 87th Congress which convenes in January 1962.

Wilderness Bill. The bill to establish a National Wilderness Preservation System (S. 174) passed by the Senate on September 6, went on to the House of Representatives. It was referred to the House Committee on Interior and Insular Affairs, of which Representative Wayne N. Aspinall of Colorado is chairman. That Committee's Subcommittee on Public Lands planned to hold hearings on the bill in the western states in late October and early November. Chairman of the subcommittee is Representative Gracie Pfost of Idaho.

The Senate passed the Wilderness Bill, after two days of debate, by a vote of 78 to 8. The principal amendment, offered by Senator Gordon Allott of Colorado, would have required affirmative Congressional approval of any Presidential recommendation regarding a wilderness area. This amendment was supported by forest industry organizations, and livestock and mining industry groups. It was defeated, 32 yeas to 53 nays. A similar amendment will probably be sought next year in the House.

Conservation organizations that have been seeking the wilderness legislation for the past six years include the Wilderness Society, Wildlife Management Institute, National Parks Association, Izaak Walton League, the Sierra Club, and other western outing groups. Numerous hearings were held by Congressional committees, and thousands of pages of testimony taken, but this year was the first time the wilderness proposal reached a vote in either body of Congress. Its fate in the House next year is still uncertain.

Shoreline Studies. Another measure passed by the Senate during this year's session was a bill (S. 543) to promote the preservation of certain shoreline areas. One section of the bill would authorize $400,000 for the Department of the Interior to study and report within two years on the suitability of certain shoreline areas for public recreation purposes. Another section would authorize a similar amount for the Department of Agriculture to study shorelines in the national forest system. Areas to be studied by Interior are specifically named; Agriculture would be authorized to study all shorelines within national forests.

Another provision of the bill would authorize up to $25 million in federal grants to help states acquire and develop shoreline recreation areas on the oceans, Gulf of Mexico, Great Lakes, and inland river systems. The amount was raised to $25 million from the $10 million called for in the original bill by an amendment approved in the Senate Committee on Interior and Insular Affairs. After passage by the Senate, the bill moved on to the House and was referred to the corresponding House Committee.

Multiple Use for Public Lands. Shortly before the end of the session, several members of the Senate and House introduced bills to provide that the public lands administered by the Secretary of the Interior "shall be managed under principles of multiple use and to produce a sustained yield of products and services." Introduced presumably at the request of the Interior Department, the bills are patterned after the Multiple Use Act of 1960 which applies to the national forests under the Department of Agriculture. The House proposal states specifically that it is in furtherance of the policy expressed by Congress in that Act; the Senate version spells out objectives in greater detail. Both bills use the words "national land reserve," the Interior Department's new term for the unreserved and unappropriated public domain lands administered by the Bureau of Land Management.

Broader Grazing Advisory Boards. On the same day that the multiple use bills for the national land reserve were presented in Congress, Interior Secretary Udall announced a plan for broader representation on state and national grazing district advisory boards. Under the new plan, the national board and the ten state grazing advisory boards in the West will include representatives of timber, mining, recreation and wilderness, water, and

other nonlivestock groups. Heretofore, membership on the advisory boards has been limited to livestockmen, plus one individual representing wildlife interests. Considerations and recommendations by the broadened boards will not be limited to grazing matters; their duties and functions will include all subjects and resources involved in public land administration. The changes announced by the Secretary can be made without implementing legislation. Local advisory boards, however, are provided for in the Taylor Grazing Act, and Congressional action would be needed to make changes in their composition or functions.

The Allagash. An illustrated brochure recently put out by the National Park Service proposed that some 296,500 acres in northern Maine be set aside as an Allagash National Recreation Area. The area would embrace most of the Allagash River course and tributary lakes. The concept of a recreation area there, according to the Park Service, stems from a 1950-1955 Federal Interagency Committee Survey of the resources of the New England-New York region in which a wilderness recreation area in the Allagash country was recommended. The Park Service has been making a series of studies in the area since 1956. In transmitting the new brochure, Park Service Director Conrad L. Wirth said that the Allagash country is "the last landscape of its size and character in the eastern United States, and represents a last opportunity here to reserve a nationally significant area for canoeing and other forms of wilderness recreation."

The area involved is in forest industry ownership and under management for the production of pulpwood and other timber products. The owners allow public use of their roads, and, in cooperation with the Maine Forest Service, have developed camping sites and made the area available for public recreation. Recently the owners adopted a new policy for the preservation of the scenic beauty of the area, compatible with the use of the forest land for timber production.

Towns and cities of the area, which benefit directly from the paper industry, generally oppose the project, as do some of the sportsman's organizations. Under an ironic heading "Save the Allagash!" the National Lumber Manufacturers Association in a recent "Lumber Letter" remarked that although the area had been logged repeatedly over the past hundred years, it is now described as "outstanding wilderness." It wondered why continuance of modern forest management practices and the present public recreational use would "abuse the natural scene, destroying recreation values prized there."

World Conference on Parks. Seattle, which was host last year to the Fifth World Forestry Congress, will again welcome delegates from around the world when the First World Conference on National Parks meets in July 1962. Some forty national organizations and scientific societies will participate. A steering committee, with eastern and western branches, has been meeting in Washington, D. C. and in San Francisco to plan programs and arrangements. The committee has received several thousand dollars in private contributions. It hopes also that Congress will grant some federal funds to help meet conference costs.

Congressmen on Tour. Members of the Subcommittee on Forestry of the House Agriculture Committee planned a tour of western states this fall following the adjournment of Congress. They were to study lumber operations in the Pacific Northwest and look into the question of Park Service *vs.* Forest Service management of certain recreation lands. Chairman of the Subcommittee is Representative George M. Grant of Alabama.

They Want Accessibility. Speaking at AFPI's recent Forest Land Use Conference in Washington, Richard E. McArdle, chief of the U. S. Forest Service, said he was "going out on a limb" to predict that formal designation of additional large areas of national forest land for wilderness-type preservation is not likely. He expects the present total acreage of wilderness areas in the national forests to remain relatively stable. The reason, Dr. McArdle said, will be the "insistence by the great mass of recreational users of public forest land on readily accessible areas where they may go with their families to camp, picnic, hunt, or fish. These people favor preservation of wild conditions, but they also want accessibility."

Wildlife in ACP. Agricultural practices beneficial to wildlife are now included in the Agricultural Conservation Program. Participating farmers may receive federal cost-sharing up to 50 percent of the cost of projects that improve conditions for wildlife, according to the revised ACP rules for 1962. The permitted practices generally follow the "G" practices of the Conservation Reserve ("Soil Bank") Program, authorized by Congress in 1956, and now discontinued because Congress did not appropriate money this year to keep it going. These practices include restoration of wetlands habitat, construction of new water areas, planting of trees or vegetative cover for wildlife purposes, and other wildlife practices "with substantial soil and water conservation values" that may be approved by state agricultural committees in cooperation with state fish and game agencies. This is the first time conservation practices primarily of benefit to wildlife have been included. Forestry practices—tree planting and timber stand improvement—have been included in the Agricultural Conservation Program for many years.

Hunting on Refuges. The Interior Department proposed to add more than a dozen national wildlife refuges to the list on which hunting and/or sport fishing will be permitted. Special regulations already have been published in the *Federal Register* for big game hunting on the Camas, Deer Flat, Hart Mountain, Malheur, Columbia, Medicine Lake, Little Pend Oreille, and Willapa National Wildlife Refuges, and the Sheldon Antelope Refuge and Range.

Wisconsin Outdoor Program. Governor Nelson of Wisconsin has proposed to the state legislature a 10-year $50 million program for resource development and outdoor recreation. Both land easements and outright purchase are suggested. The program would be financed by a one-cent tax on cigarettes; the money used for acquiring, developing, and maintaining state parks, forest recreation areas and fish and game habitat, and for youth conservation camps, highway scenic easements, creation of new lakes, state aids to metropolitan areas, tourist information centers, planning and coordination, and study of the Lake Superior region.

Prairie National Park Proposal. It has been proposed that a Prairie National Park be established in Kansas to preserve examples of prairie grasslands. In a report urging the creation of a 57,000-acre area in Pottawatomie County north of Manhattan the National Park Service says that unless a portion of grassland is set aside soon "it will be difficult or impossible to find an area large enough and otherwise suitable for preservation in the National Park System. . . ."

Forestry News

Land Use Problems Are Conference Subject

Some 200 persons attended the Forest Land Use Conference held at the Shoreham Hotel in Washington, D. C., September 21-22, under the sponsorship of American Forest Products Industries, Inc. As stated by AFPI, the purpose was to "bring out the best possible opinions as to how this nation's forest lands may best serve the economic, recreational and spiritual needs of the growing population."

This subject was explored by three panels made up of representatives of government, industry, labor, and conservation organizations who viewed it from the standpoint of government, industry, and small landownerships. Bernard L. Orell, vice president of Weyerhaeuser Company, served as moderator. Open discussion followed each panel.

The conference was notable for the variety of views expressed, for frank and direct yet harmonious discussion, and for the apparent fact that all viewpoints recognized the basic problem as one of increasing demands on a resource that is not unlimited.

B. L. Orell

In a keynote statement, George A. Garratt, dean of the Yale School of Forestry, said: "The developng pressures on the forest resources have set the stage for a growing conflict over what constitutes the most appropriate use of our forest land. The situation calls for full and rational consideration of all facets of forest land use by all groups concerned, for in a real sense the problem is everybody's business." In an analysis summarizing the conference Dean Garratt said that perhaps the most significant thing was the willingness of competing groups to meet anud hear the views of others.

Samuel T. Dana, dean emeritus, School of Natural Resources, University of Michigan, who had been scheduled to present the summary analysis, was unable to attend due to illness.

A highlight of the conference was an address by Secretary of Commerce Luther H. Hodges at a dinner meeting on September 21.

Speakers on the three panels, listed in the order named above, were:

Richard E. McArdle, chief, U. S. Forest Service; Conrad L. Wirth, director, National Park Service; Ralph C. Wible, Pennsylvania state forester; Wilson M. Compton, director, American Forestry Association; Mrs. J. Campbell Palmer III, chairman of the Civic Development Committee, National Council of State Garden Clubs, Inc.; Howard Zahniser, executive secretary, The Wilderness Society; Hardin R. Glascock, Jr., forest counsel, Western Forestry and Conservation Association.

O. G. Traczewitz, chief forester, Southern Kraft Division, International Paper Co.; Edward P. Cliff, assistant chief, U. S. Forest Service; Thomas L. Kimball, executive director, National Wildlife Federation; Paul L. Phillips, president, United Papermakers and Paperworkers; Joseph L. Fisher, president, Resources for the Future, Inc.; Curtis M. Hutchins, chairman of the board of Dead River Company.

James G. Yoho, professor of forest economics, Duke University; John I. Taylor, assistant legislative director, American Farm Bureau Federation; Arthur M. Sowder, extension forester, Agricultural Extension Service; Joseph W. Penfold, conservation director, Izaak Walton League of America; Arthur J. Schwaiger, Sparta, Mich., tree farmer; T. B. Plair, head woodland conservationist, Soil Conservation Service; George W. Dean, Virginia state forester.

Spanish Foresters Study Logging Methods Here

Six forest engineers from Spain visited logging operations in the United States late this summer. The study was sponsored by the International Cooperation Administration, with technical advice by the U. S. Forest Service.

The group studied various logging operations in the Appalachian Mountain region and the southern states, followed by a visit to a few operations in California. They also visited the Forest Service Equipment Service Depot at Areadia, Calif., and the Forest Products Laboratory at Madison, Wis.

The visitors were six field leaders in the Spanish Forest Service, graduates of the forestry engineering course at the National Forestry School in Madrid. Technical leader for the study was E. L. Demmon, for 33 years a member of the U. S. Forest Service, until his retirement in 1957. He is now a forestry consultant at Asheville, N. C.

1960 Wood Preservation Statistics

The "1960 Wood Preservation Statistics," compiled by Gordon D. Merrick of the U. S. Forest Service, show an increase of 1.6 million cubic feet of

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material treated with preservatives and fire retardants over the 1959 totals. The survey included information on the production activity of 359 wood-preserving plants, of which 274 use pressure processes, 57 nonpressure processes and 28 are equipped for both types of treatment.

During 1960, 93 percent of the total volume of 216.1 million cubic feet of material was treated by pressure processes. While the use of straight creosote decreased, use of creosote-coal tar solutions increased nearly 8 million gallons or 26 percent. Creosote or creosote solutions were used for 70 percent of the material treated, petroleum-pentachlorophenol for 19 percent and creosote-pentachlorophenol solution for 4 percent. All other preservatives and fire retardants were used for 7 percent of the material. Material given fire retardant treatment totaled approximately 1.2 million cubic feet, an increase of 14 percent over 1959.

The production of crossties and poles increased slightly (2 percent), but the proportions of other materials were approximately the same as 1959; lumber and timbers, 18 percent; piling, 8 percent; fence posts, 6 percent; switch ties and crossarms, each 2 percent; and miscellaneous materials, 3 percent.

The use of liquid preservatives in 1960 totaled 186,000,562 gallons, a 2 percent increase, and consumption of solid preservatives was 23,292,236 pounds, representing a decrease of 5 percent.

Industrial & Private

IFA Forester Promoted

Norman E. Bjorklund, Portland, Ore., has been promoted to chief forester, Industrial Forestry Association, according to W. D. Hagenstein, executive vice president.

Bjorklund is a 1948 graduate of Oregon State University's School of Forestry and a World War II Air Corps veteran. He has been IFA district forester in the Columbia River area since 1948. He has supervised the West Coast Tree Farm program which now embraces 6.1 million acres; the IFA Greeley Forest Nursery, Nisqually, Wash.; and is now directing development of the new IFA nonprofit forest nursery at Canby, Ore. He is secretary of the Northwest Forest Pest Action Council and immediate past chairman of the Portland Chapter, Society of American Foresters.

Keith Petrie, Portland, a 1952 graduate of Oregon State University's School of Forestry, succeeds Bjorklund as district forester. Petrie is an Army veteran and his previous professional experience was as assistant wood supply manager for Kaiser Gypsum Company, St. Helens, Ore. and consulting forester with Tree Farm Management Service, Eugene.

Ed J. Jankowski Heads Industrial Foresters Group

Edwin J. Jankowski, chief forester for The Northwest Paper Company of Cloquet, Minn., was elected president of the Lake States Council of Industrial Foresters at the group's recent meeting in Cloquet. Jankowski replaces R. W. Blair of Filer City, Mich., as head of the Council.

The Council is composed of technical foresters employed by pulp and paper, lumber and veneer companies.

Other Council officers and directors are Bruce G. Buell, chief forester, Marathon-American Can Company, Green Bay, Wis.; E. S. Hurd, forester, Consolidated Water Power & Paper Company, Rhinelander, Wis.; J. B. Millar, woodlands manager, Kimberly-Clark Corporation, Neenah, Wis.; and Bruno Berklund, forester, Nekoosa-Edwards Paper Company, Port Edwards, Wis. Mr. Blair becomes a member of the board of directors.

Vancouver Plywood Promotes Forester

Ralph Stryker has been made manager of the log and timber division of Vancouver Plywood Co., it has been announced by Donald I. Plummer, Jr., executive vice president and general manager.

Stryker's operating area includes company resources in Oregon, Washington, and Montana. He will be responsible for an annual cut of 80 million feet of both private and U. S. Forest Service timber.

Stryker graduated from the University of Washington College of Forestry in 1937. He spent 10 years with the U. S. Forest Service in various management capacities in Oregon, Washington, South Dakota, Nebraska, and Colorado. After a period of three years with the Columbia River Log Scaling Bureau in Portland he became chief forester for Columbia River Paper Mills. He joined Vanply in 1959 as assistant timber manager.

St. Regis Scholarships Announced

St. Regis Paper Company annually awards five undergraduate scholarships in forestry—three in the South and one each in the Northeast and the Northwest. The $800 per year scholarships are first awarded in the junior year and continued in the senior year upon successful performance of the recipients.

(Continued on next page)

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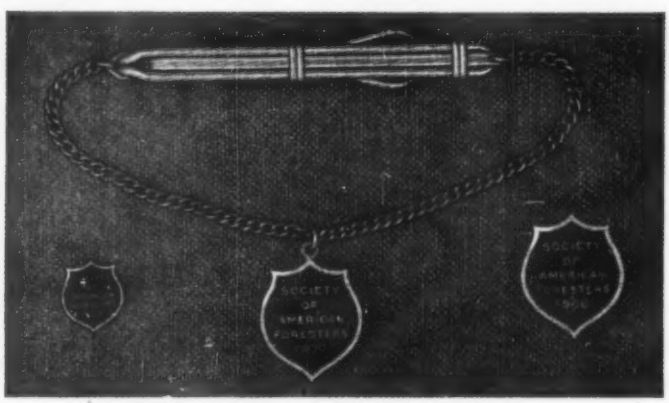

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MORE THAN 150 people turned out despite inclement weather to attend the formal dedication of International Paper Company's new 126,000 acre Tree Farm at Cross Lake, Maine, on Sept. 15. Morris Wing, I-P's resident woods manager, is shown here addressing the group with the newly-built public boat ramp and picnic area shown in the background.

This year's new scholarships were awarded as follows:

In the South—Frank H. Avant, Auburn University; Roger L. Eubanks, the University of Florida; and Calvin F. Robertson, the University of Georgia.

In the Northeast—Thomas P. Leavitt, the University of Massachusetts.

In the Northwest—Edmund R. Bodyfelt, Oregon State University.

Longview Fibre Co. Appoints Chief Forester

R. P. Wollenberg, executive vice president of Longview Fibre Company has announced the appointment of Fred J. Sandoz as chief forester of the firm. In his new position Sandoz will report to W. Lee Robinson, manager, timber department. The position of chief forester has been vacant since Robinson was promoted to manager earlier this year.

Sandoz was formerly land and logging manager for the Booth-Kelly Lumber Company and professor in forest management, logging and milling, and wood utilization at Southern Illinois University.

Public

Advisory Committee Views Forest Uses

Methods of managing water, timber, recreation, forage, scenery and other products of the national forests were under study September 6-8 by a 14-member committee of citizens from all sections of the United States. The group, known as the Advisory Committee on Multiple Use of the National Forests, headquartered at Hochlandhof Lodge in Winter Park, Colo., and viewed demonstrations of resource use on nearby parts of the million-acre Arapaho National Forest located in the heart of the Colorado Rockies along the Continental Divide west of Denver.

Members of the committee advisory to the U. S. Forest Service include A. D. Aldrich, Tallahassee, Fla.; Guy N. Bjorge, San Francisco, Calif.; John H. Breckenridge, Twin Falls, Idaho; Ezra J. Fjeldsted, Layton, Utah; Charles S. Kelly, Chicago, Ill.; Hillman Lueddemann, Portland, Ore.; William McGregor, Hooper, Wash.; William E. Morgan, Fort Collins, Colo.; Samuel B. Morris, Los Angeles, Calif.; Mrs. J. Campbell Palmer III, St. Albans, W. Va.; Mrs. Robert T. Platt II, Portland, Ore.; William E. Richards, Holdrege, Nebr.; Lucian A. Whittle, Brunswick, Ga.; and Hugh B. Woodward, Albuquerque, N. Mex. Ten of the 14 members attended the meeting with Breckenridge, Kelly, Richards, and Woodward absent.

R. E. McArdle, chief of the Forest Service, Washington, D. C., was also present with several members of his staff; as were D. S. Nordwall, Rocky Mountain Region regional forester

from Denver, and R. E. Price, director of the Forest and Range Experiment Station at Fort Collins, Colo.

The Committee made no immediate recommendations to McArdle concerning the phases of resource management reviewed, since the main purpose of the meeting was to acquaint Committee members with national forest multiple use activities on the ground. They commented as a group that they were impressed with the compatibility of the multiple uses made of national forest lands.

Engineering Research to Be Furthered

The U. S. Forest Service has announced the establishment of two new centers for research in forest engineering.

H. Minor Huckeby, formerly regional engineer of Region 4, Ogden, Utah, has been transferred to the staff of the Intermountain Forest and Range Experiment Station and will direct activities of an engineering laboratory at Bozeman, Mont.

Rulon B. Gardner will be project leader of the Northern Forest Engineering Laboratory, to be located on the campus of the Michigan College of Mining and Technology, Houghton. He was previously in the regional office of the Forest Service at Juneau, Alaska.

Biometrician Transferred to Washington

Thomas C. Evans, chief of the Biometry Section at the Southeastern Forest Experiment Station, has been transferred to a Washington, D. C., position to direct all biometrical studies for the U. S. Forest Service nationwide.

A native of Pennsylvania, Evans attended the Pennsylvania State College (Mont Alto) and graduated from North Carolina State College with a B.S. in forestry. He also holds a Master of Science degree in forest economics from North Carolina State.

In 1931 Evans joined the U. S. Forest Service and served with the Southern Forest Experiment Station in New Orleans. He transferred in 1938 to the Appalachian Forest Experiment Station in Asheville to head the mensurational and statistical aspects of the Forest Survey in the Southeast. Early in World War II he enlisted in the U. S. Navy, subsequently serving nearly three years in the South Pacific. He returned to Asheville and from 1949 to 1955 worked as staff specialist in mensuration, statistics, and experimental design. Since 1955 he has served on the director's staff as station biometrician.

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Hutchison Heads Division

Blair Hutchison of the Division of Forest Economics Research, Intermountain Forest and Range Experiment Station, Ogden, Utah, has been promoted to chief of the Division. Hutchison has been acting chief since the transfer of E. V. Roberts to the International Cooperation Administration in June.

Mr. Hutchison, a native of Denver, Colo., is a graduate in forestry from the University of Michigan. He has worked with the U. S. Forest Service since 1934, chiefly in the western states. For several years he was forest economist for the Northern Region, with headquarters in Missoula, Mont.

From 1942 to 1946 he was at the Southern Forest Experiment Station for special assignment with the War Production Board. He retutrned to the Northern Rocky Mountain Station in 1946 and remained there until that Station was consolidated with the Intermountain Station in 1954. He is author of numerous technical publications in forest economics.

James N. Faber Named Director of Information

Secretary of the Interior Stewart L. Udall has announced the appointment of James N. Faber, Seattle newsman, as assistant to the Secretary and director of information.

At the same time he approved the nomination of Daniel B. Beard of the National Park Service to be a NPS assistant director in charge of a newly-created public affairs section.

Romberger Joins Beltsville Staff

John A. Romberger, formerly plant physiologist with the Pacific Southwest Forest and Range Experiment Station of the U. S. Forest Service, has transferred to the staff of the Forest Physiology Laboratory of the Forest Service at Beltsville, Md. Dr. Romberger graduated from Swarthmore, received an M.S. degree from Pennsylvania State University, and a Ph.D. degree from the University of Michigan. Before his appointment with the Forest Service he held a postdoctoral fellowship at the California Institute of Technology. His research at Beltsville will be concerned with growth control mechanisms in trees.

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Schools

Husch in Charge of Forest Survey in Chile

Bertram Husch, professor of forestry at the University of New Hampshire and chairman of the New England Section, SAF, has accepted a position as forestry officer with the FAO in charge of a forest survey in Chile.

E. C. Mobbs, Visiting Professor

Eric C. Mobbs, vice chancellor of the University College of North Wales at Bangor and head of the Forestry Department there, is serving as visiting professor at Oregon State University School of Forestry this fall.

Professor Mobbs is president of the Society of Foresters of Great Britain.

Two Join Staff of Humboldt State College

Dr. Peter P. Black and Dr. Harry V. Wiant, Jr., have joined the Humboldt State College forestry faculty, Arcata, Calif. Dr. Black completed work for the Ph.D. degree in watershed management in June 1961 at Colorado State University where he was a Charles Lathrop Pack Forestry Foundation research assistant and received a Boettcher Foundation Fellowship. He earned the Bachelor and Master degrees in forestry at the University of Michigan. He will teach courses in forest and range hydrology, dendrology, and beginning forest engineering.

Dr. Harry V. Wiant completed his doctoral work in silviculture at Yale University late in the summer of this year. Dr. Wiant received the Bachelor degree at West Virginia University and the Master of Forestry degree at the University of Georgia, where he served as a research assistant in silviculture. He will teach courses in silviculture and forest management, replacing temporarily Edwin P. Pierson, who is on leave for doctoral work.

A four-year curriculum in forest management was instituted at the college in 1957. Dr. Edward E. Sturgeon is coordinator of the forestry program and is teaching undergraduate courses presently.

The Master of Forestry degree has been approved for the college by the State Board of Education, and graduate courses will be offered in the academic year 1962-1963. A new forestry building with approximately

18,000 square feet of floor space, complete with laboratories, climate-controlled rooms, and a greenhouse, will be ready for the fall semester 1962.

Muhlenberg Appointed Lecturer

Dr. Nicholas Muhlenberg, forest economist, was appointed a lecturer in the University of California School of Forestry at Berkeley for the fall semester.

Muhlenberg served as a forestry officer in the Food and Agriculture Organization at Geneva, Switzerland, during the past year.

Before joining the international agency, he was a research analyst with the Crown Zellerbach Corporation in Portland, Ore.

Born in Pennsylvania, Muhlenberg earned Bachelor and Master degrees in forestry at the University of Michigan, and Master and Ph.D. degrees in forest economics at Yale University.

Conservation Foundation Grant

The Conservation Foundation of New York has approved a two-year grant to Bernard Frank, professor of watershed management in the College of Forestry and Range Management, and Robert E. Dils, leader of the Cooperative Watershed Management Unit at Colorado State University, to prepare a textbook on watershed management, the first of its kind. This work is designed to fill the needs both of students specializing in this field and of foresters, range, wildlife and recreation management specialists, civil and water-resource engineers, soil scientists, agronomists, social scientists, and lawyers concerned with analyzing, applying or facilitating watershed practices, plans or programs. The book will include material on foreign watershed problems, research, and practices to the extent suitable information is available, for use by technicians engaged on cooperative projects abroad for the United States or United Nations.

The Conservation Foundation has previously sponsored such works as *Vegetation and Watershed Management, Water Facts for the Nation's Future, Floods, The Flood Control Controversy,* and *Teaching Science Through Conservation.*

Clemson College Appoints Two Additional Foresters

William A. Shain and Larry D. Reamer have been added to the staff of the Forestry Department of Clemson College.

Shain, assistant professor of forestry, received a B.S. degree in for-

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estry from the University of Georgia in 1953 and a Master degree in 1957. During 1957-1959 Shain was on the staff of the Mississippi State University as instructor in forestry. In 1960 and 1961, he completed his residence toward his doctorate at Michigan State University. He will be engaged in teaching and research in mensuration and photogrammetry.

Reamer was in the U. S. Air Force 1955-1957. He enrolled at Clemson College in the fall of 1957 and received a B.S. degree in forestry in 1961. He will be engaged in assisting in the management of the 19,000-acre Clemson School Forest.

The Clemson College Department of Forestry, of which Dr. Koloman Lehotsky is head, has twelve members on its teaching, research, and management staff. The department was established July 1, 1957 and has offered a professional course in forestry since then.

Allied

La. Forestry Officers Elected

W. M. Palmer, Jr. of Good Pine, La., was elected president of the Louisiana Forestry Association at the group's recent two-day annual meeting in Alexandria. Palmer, a professional forester, is vice president in charge of timberlands for Bodeaw Company.

Other officers are W. E. Dietrich of Minden, first vice president; C. E. Roberts of Bastrop, second vice president; F. E. Hernandez of Leesville, third vice president; and W. N. Darwin of Oakdale, treasurer.

COFAE Elects Officers

E. R. Wagoner, executive secretary of the Texas Forestry Association, was named chairman of the Council of Forestry Association Executives at the recent annual meeting in Atlanta, Ga. Ben F. Park, secretary and public relations director of the North Carolina Forestry Association, was elected vice chairman. Alfred M. Williams, Jr., executive secretary of the Massachusetts Forest and Park Association, is the new secretary-treasurer.

The Forest Farmers Association, the Georgia Forestry Association, and the Southern Pulpwood Conservation Association were hosts for the two-day meeting. Purpose of the Council is to interchange ideas in forestry association work.

Young Rainer, business manager, represented the Society of American Foresters.

Forestry Employment

S.A.F. members are privileged to insert one 60-word advertisement in this column without charge. Forest industries desiring to employ foresters may insert advertisements at the rate of $4 per column inch. Copy must be received by the end of this month for an advertisement to appear in the issue after next.

Obviously the Society cannot assume responsibility beyond making it possible for prospective employee and employer to enter into negotiations.

Positions Available

Wood utilization teacher wanted for expanding forestry department. Minimum requirements: Master's degree with work toward Ph.D.; teaching and industrial experience highly desirable. Position requires knowledge of products, logging, log and lumber grading, and manufacture.
Write to H. H. Chamberlin, Head, Forestry Department, Arkansas A. & M. College, College Heights, Arkansas.

Two newly created positions in forest pathology, forest entomology or forest soils in teaching and research. Completion or near to Ph.D. or equivalent. Starting rank and salary depend on experience and training of applicant. Teaching responsibilities include three semester hours in one of above disciplines, remaining time devoted to research. Working conditions, salary and professional opportunities favorable. New facilities to be provided. Positions effective June 1, 1962.
Apply to: Dr. Arne K. Kemp, Head, Department of Forestry, Stephen F. Austin State College, Nacogdoches, Texas.

Forester. Experience in general forestry work in Southern New England area. Good position open to right person.
Box F, Society of American Foresters, 425 Mills Building, Washington 6, D. C.

Positions Wanted

Forester, B.S. and M.S., age 35, desires to enter the education field. Eleven years' experience in wood-using industry. Last six years have been in industry management. Some teaching experience while a graduate assistant. Prefer central states or lake states location.
Box A, Society of American Foresters, 425 Mills Building, Washington 6, D. C.

Experienced Forester with government would like challenge with cost-conscious, private logging organization. Prefer tough shows—South or Southwest. (Not interested in pension plans or retirement benefits.)
Box B, Society of American Foresters, 425 Mills Building, Washington 6, D. C.

Graduate Forester, aggressive, progressive, good references; 12 years' experience in land management work, fire control, some procurement, land acquisition, and C.F.I. Fair speaker and writer. Enjoy working with group or individuals. Have children approaching high school age. Interested in fairly permanent location with good schools and churches. Prefer Lake States or Northeast. Opportunity for further study desired.
Box C, Society of American Foresters, 425 Mills Building, Washington 6, D. C.

Forester, B.S.F., West Virginia University, desires position in wood-using industry or related field. Wood utilization major, will graduate February 1962, immediately available thereafter. Will consider any position. Age 23, married; no military obligation. Civilian pilot's license.
Box D, Society of American Foresters, 425 Mills Building, Washington 6, D. C.

Research Forester, Ph.D., 1952, 12 years' experience including three years with educational institution. Wants full time research position with Forestry School, private industry, or government. Major fields of interest: forest soils and silviculture.
Box E, Society of American Foresters, 425 Mills Building, Washington 6, D. C.

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A glossary of technical terms used in forestry. Included are definitions of terms that the practicing forester uses in his daily work and encounters in forestry literature. (1958 edition.) **Price postpaid $3.50.**

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All the working methods, techniques, and vital data of on-the-ground forestry as practiced in the United States and Canada today. (1955. 1201 pp., 744 illus., tables.) **Price postpaid $15.**

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